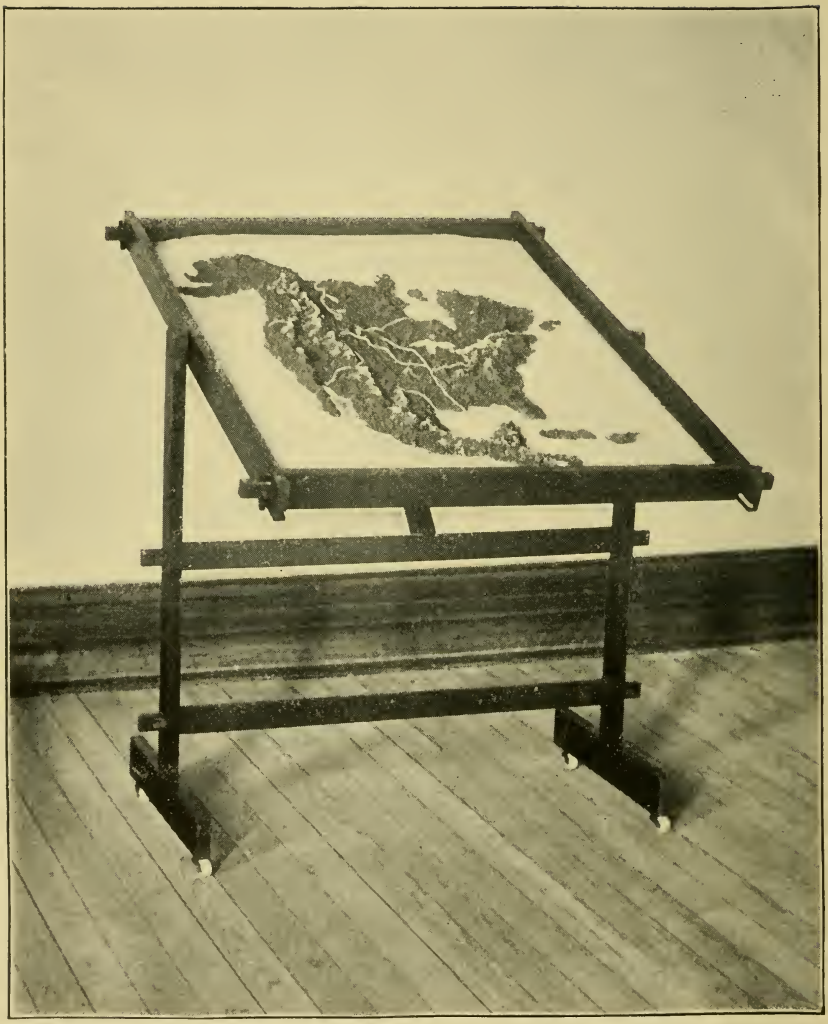
MAP MODELING IN GEOGRAPHY AND HISTORY.

ALBERT E. MALTBY.



MODELING BOARD WITH MAP OF NORTH AMERICA.

MAP MODELING IN GEOGRAPHY

INCLUDING THE USE OF

SAND, CLAY, PUTTY, PAPER PULP, PLASTER OF PARIS, AND OTHER MATERIALS

ALSO

CHALK MODELING

IN ITS ADAPTATION TO PURPOSES OF ILLUSTRATION

FULLY ILLUSTRATED

BY

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TO
MY MOTHER
RACHEL EMELINE MALTBY
THIS BOOK IS DEDICATED AS A
TRIBUTE OF LOVE AND HONOR

PREFACE.

THE use of modeling as a means of symbolizing the various land forms in geography has become so valuable in these days of advanced methods in teaching, that it is thought these abstracts from the practical methods of a schoolroom may be found helpful to many teachers. Any application of the anthropomorphic idea of fashioning or making will follow the law of all child-thought in that the unknown is assimilated to the known. The child is really and directly familiar with only one mode of origin, and that is the making of things. One of the great joys of children is to be able to make things; and this desire, which is indeed very great, should be utilized in their instruction.

All the elements of geographical science are found near every schoolhouse; therefore the home district should be studied first. Ritter says, "Wherever our home is, there lie all the materials that we need for the study of the entire globe."

The available language of geography can alone render these home elements valuable; and modern educators are almost unanimous in the claim that speech, modeling, pictures, sketches, and maps form the primal language of the science. These symbols, however, are of use only when they fix a mental picture of the thing represented, and do not fix attention upon themselves. Through the constructive phase of the imagination, unseen places and peoples must be brought vividly before the mind, and the pupils may then translate them into the language of models, chalk models, pictures, and maps.

Geography is truly a study of the earth as the home of man,

and should become "a school of culture for the human race, and an essential link in the chain of sciences." All molding or drawing that simply reproduces the form of the map, without enlarging and completing the pupil's concept of surface structure, fails of its intended object. It becomes a hindrance rather than an aid, since it fails to build up in the mind a concept of the country or continent as a unit.

The teacher will, however, use modeling as a *means*, not as an *end*, and thus make it a power in good instruction.

A. E. M.

State Normal School, Slippery Rock, Pa.,
May 10, 1895.

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MAP MODELING IN GEOGRAPHY.

ELEMENTARY GEOGRAPHY.

If there is any study in which it is especially important that a proper and intelligent beginning should be made, that branch is geography. Teachers often fail to make proper presentation of the subject because they do not study their pupils, and therefore cannot understand what the children need. The author of *Émile* says: "Nature requires children to be children before they are men;" and also, "A child has neither the strength nor the judgment of a man, but he is capable of feeling and hearing as well, or at least nearly so." Teachers fail through neglect of the proper study of the natural propensities of children. In children the creative faculty is strongly developed, and is manifested in an infinite number of ways. Watch that little child as he plays in his father's garden. He has no knowledge of geography as a science, yet he has gained what the Gemans call Erdkunde—earth-knowledge. Here he has represented the course of a stream by his furrows and ditches in the soft and yielding soil; there he examines into the effect of water upon his little wheel placed at the fall made in the stream which he has dammed up to form a miniature pond. Everything must subserve to this impulse toward formation. Here a splendid mansion stands in all its glory of colored blocks; there a thriving village extends along the plain. Roads of sawdust or of sand lead from the mansion to the village, while a miniature forest of beautiful green moss crowns the neighboring hill. Even an artificial sea is not forgotten; and,

perhaps, a little brother leads out the whole menagerie of Noah's ark to graze upon the surrounding meadows. Rivers and canals, bridges, dams, mills, seaports,—all are there. Who can demonstrate the many-sided significance, the glorious possibilities of the proper application of these plays of childhood? Play, which is the poetry of childhood, is an activity which ministers to the needs of the child, but it is also a guide to the teacher in determining upon a method of instruction. It is a powerful force to be used in the work of education. The true teacher learns some of his best lessons from his pupils. Let us learn a lesson here. Let us remember with Rousseau that our first instructors are our feet, hands, and eyes. Substituting books for the natural means of obtaining knowledge is not teaching us to reason, but teaching us to use the reasoning of others; it is teaching us to believe a great deal, and never to *know* anything.

How then should elementary geography be taught in our schools? The answer seems obvious. Utilize from the start the natural creative longing of the child. We shall gain if we let the children lead us. We know that a proper exercise of the creative power produces most happy results in their education. This is especially true when the thing made takes some definite form. *Bring the sand-table into the schoolroom.* The molding-board then becomes a powerful means of cultivating the idea of form. It aids in teaching the children *to see*. *Seeing*, as an art, has been much neglected. Children must be taught to observe accurately, and then to reflect on their observations. Open their eyes to the beautiful things of the world in which they live. The teaching them becomes objective; the children acquire ideas from the object of thought, and learn to express them correctly. By far too many people go through life without ever realizing that the eyes must be educated to *see*, as well as the tongue to speak.

With young children, especially, it will not do for the teacher

to adopt the lecture system of recitation. No amount of words, however simple and well chosen, will avail much unless the child is brought to express himself on the subject in his own language. Short, clear, and intelligible questions should be given in order to excite him to observe what is before him, to recollect what he has learned, and to bring together his stock of knowledge for the materials for an answer. "From observation and memory there is only one step to reflection," says Pestalozzi.

Karl Ritter, who first brought geography to the rank of a science, says: "The most natural method is the one which makes the child familiar with reality first; which lays a sound foundation of geographical knowledge, gained through actual observation of that part of nature which surrounds the child. Here he is to learn to see. Whether he lives in the city or in the hamlet, on the mountain or in the valley, it is certainly not within the four walls, not from maps, and not from text-books, but in nature alone that knowledge of nature will be gained by him. Nature ever remains the same; she knows no typographical errors, no blunders in drawing, no want of discretion. Nature's teaching is always perfect." This elementary method combines all the requirements of science; it furnishes the stratum of concrete knowledge from which abstract ideas are drawn. Amid nature the child learns to know the country in all its various conditions, and learns to recognize it even on the flat-surfaced representation, the map. When this genuine elementary instruction is given, all difficulties of subsequent instruction in geography are removed.

MATERIALS IN SAND-MODELING.

In many respects the sand-heap of the playground is the ideal form for the presentation of this medium of symbolizing, and its introduction into the kindergarten in this primitive form is fre-

quently seen. The needs of the ordinary public school demand a more convenient form, however, and this need is met by the use of the molding-table, the molding-board, and the modeling-pan.

In order that good work may be done in the classroom, it is necessary that provision be made for at least one large modeling-board. A small table, with strips of board three inches wide nailed around the edges, will make a very good molding-board

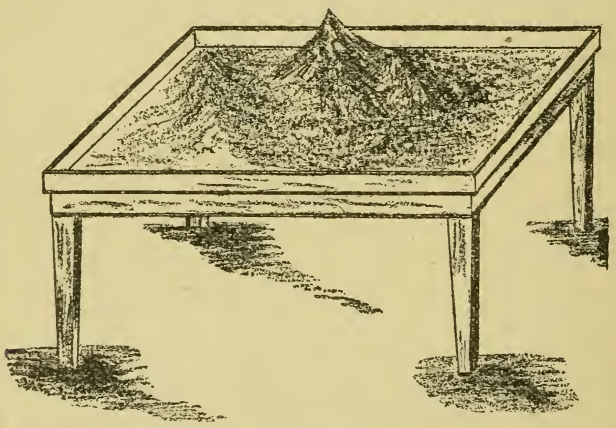


FIG. 1.

for use in a school. The top of the table should have its width and length in the proportion of four to five (Fig. 1). A very serviceable movable molding-table is shown in the frontispiece. Any carpenter can make one readily from the details shown in the illustrations. The board shown in Fig. 2 is 32 inches wide and 40 inches long.

In order to use the following plans in molding the continents, the space within which the modeling is to be done may be marked off upon the board when the dimensions of the molding-

table are not as four to five. If the board permits, mark an oblong rectangle 32″ × 40″, and divide the sides according to the directions given in the modeling of the several continents.

The individual molding-board found most serviceable in gen-

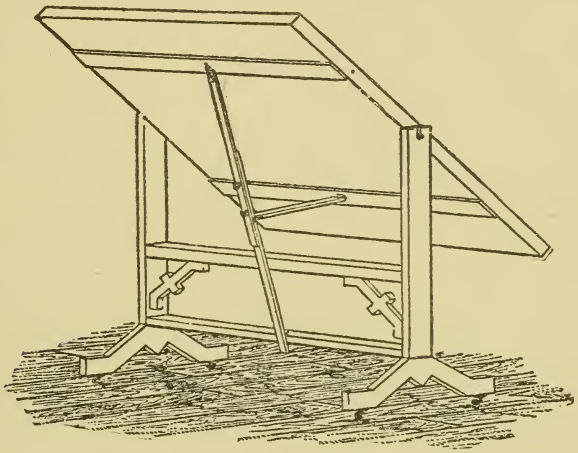


Fig. 2.

eral use is about 16 inches wide and 20 inches long. A strip of wood about one inch wide should be nailed around the edges in order to hold the sand in place (see Fig. 3).

Fig. 3.

Modeling-pans, somewhat smaller than the modeling-boards, are in use in some schools. The important point to be observed is **to individualize the work** wherever it is possible so to do.

The sand used should be either the molding-sand used in the foundry, or clean sharp sand from the lake or river. It should be kept in a convenient box, and moistened occasionally. Do not attempt to stir or mix the sand, but pour over it a small quantity of water a few hours before the material is wanted for use. The water will soak evenly into the mass, and the sand will remain in position when placed upon the board in the model of the hill or continent.

Some teachers prefer to use dry white sand, meal, salt, and other materials. These substances may be used in place of the moist sand without any considerable changes in the mode of using. Pebbles from the brook or beach, fragments of minerals, and many other materials will be suggested by the child. To him the world itself is one big house where everything has been made by somebody, or at least fetched from somewhere.

The teacher must call to her aid the children and their parents. The supply of useful material will then be limited only by the resources of the various homes represented in the school.

Value of Relief-maps.—The objection is sometimes made against the use of relief-maps that they do not correctly represent the surface of the earth, since the altitudes, in comparison with horizontal distances, are of necessity very much exaggerated. The same reasoning would prevent the civil engineer from using *profiles* to represent the elevations obtained in his topographical surveys, for the exaggeration of elevation in the profile is exactly that which attains prominence in the relief-map. The diagrams that geographers have long employed to represent elevations are simply *profiles*, and must be abandoned in all teaching if this objection to the relief-map is valid. But the fact is that such objections are in reality baseless. *We must seek after general concepts of continental outline and organization.* The flat map is, in respect to elevation at least, unmixed untruth; and even

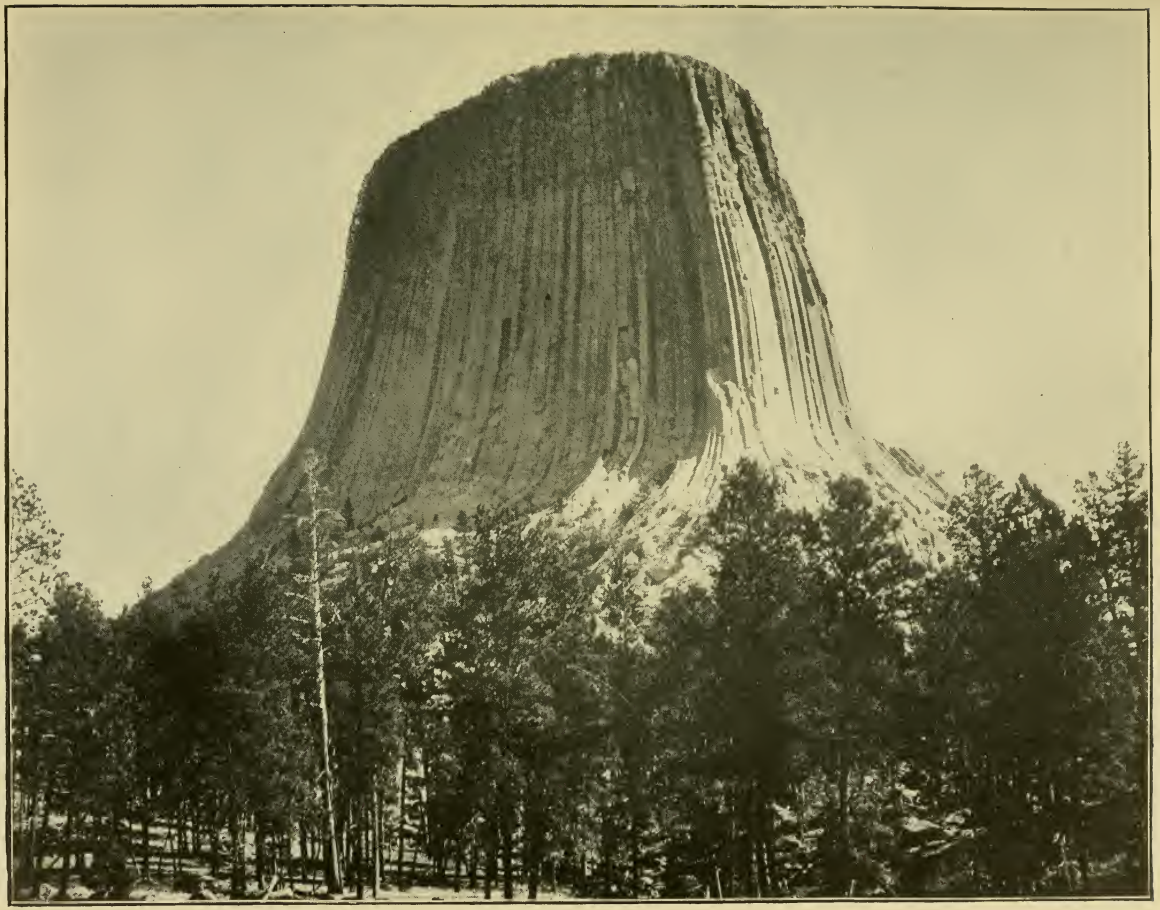


FIG. 4.—SATAN'S TOWER, WYOMING.

the coast-lines in many places must necessarily be very imperfect. Compare these shore-lines, as given in any school geography, with a topographical map of a small portion of the shore; the inaccuracy is seen at once, yet the value of the school map is not in reality impaired. *The general truth of outline is impressed, and we leave the details in their proper relation.* So, in reference to the third dimension of form, it becomes necessary to avoid the error of the entire absence of elevation by the smaller error of exaggeration. The apparently excessive prominence given to the elevations in modeling is, however, exactly that which the eye gives to all objects when seen in their natural relation to the horizontal distance. The height of any hill appears much greater than the facts of measurement of base and altitude will warrant. The eye naturally neglects horizontal distance. Notice the effect of close approach to an object in the picture of Satan's Tower, Wyoming (Fig. 4).

No teacher would insist that a general truth in regard to the base and the altitude of a given triangle could not be shown without the accurate construction of the lines and angles in their relations. Still, that is exactly the problem that we have before us. We wish to show the slopes of a river-basin, and exhibit the effects of elevation. We step to the blackboard and draw two lines meeting at an angle, and ask that these may be supposed to represent the slopes of the basin. Is it a valid objection to state that if the two slopes were actually platted to scale the eye could not distinguish where the angle appeared?

Relief-maps have been used by the best geographers to illustrate the facts of the science, and objections to such use are most apt to come from those teachers who are afraid of anything involving any expenditure of energy. "It is no wonder," says Locke, "if those who make the fashion suit it to what they have, and not to what their pupils need."

PRIMARY WORK.

The use of the sand-heap and sand-table in the primary grades should be made **definite in purpose.** The more we are able to make the modeling a means whereby the child symbolizes what he has observed, the greater will be the mental gain of the child through the use of the medium. The child has already gained many ideas about fields, hills, roads, streams, clouds, storms, trees, animals, and people. These must be used in obtaining ideas regarding remote regions. Let the teacher and pupil talk together as the modeling progresses, the child forming a mental picture as the slope or hill is molded by his hands. Thus the relief form comes into its true relation as a symbol, and the child sees the slope, hill, range, or chain. He outlines the continent, makes mountains here and valleys there; now he sees high cliffs, and sandy beaches, harbors and mouths of rivers. He shows the lines of watercourses, marks the places of swamps and deserts, forest glades, and all the varied panorama that one would behold while making the actual journey. To him—*the continent-builder*—the living world-mass rises up in miniature. What he has seen of streams and lands, of roads and cities, forms the basic material for picturing to himself the distant places.

Having first become acquainted with nature as it exists under different conditions of surface, climate, and culture, *the child knows the thing to be symbolized;* the *symbol* then has value, and not till then.

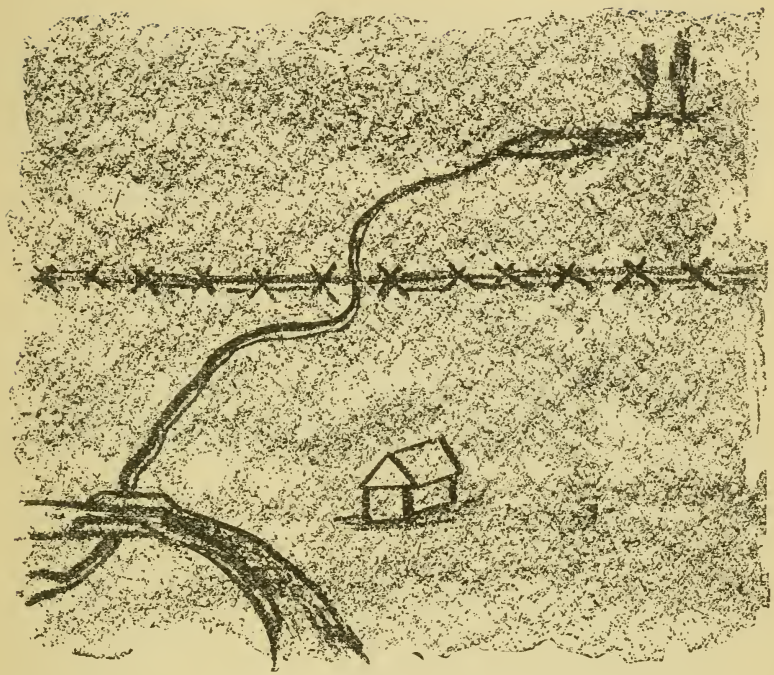


FIG. 5.

Lesson X.

THE FIELDS.

1. The children are gathered around the large molding-board or sand-table.

2. A quantity of sand sufficient to cover an oblong space near the centre is placed on the table.

3. Some of the children are allowed to make it look like [**represent**] the meadow. They will smooth it out flat, and perhaps suggest the placing of a fence around it.

4. Let them build a fence around it, using sticks, shoe-pegs, pebbles, or other available material.

Let them divide it into smaller fields, marking them to denote the various kinds,—the corn-lands, meadows, and wheat-fields. Houses may be represented by paper forms or kindergarten

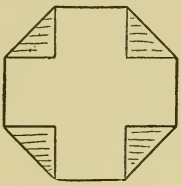


FIG. 6.

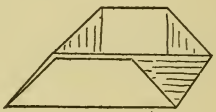


FIG. 7.

blocks. The bridge over the stream, and many other representations may be made by the employment of paper-folding.

Use blue yarn or string to represent the stream or brook. Draw white string over a piece of blue crayon.

When the children have modeled the level fields, arranged the houses, bridges, etc., each child should draw with the side of the crayon a *chalk model* (Fig. 5) of the field. The details may then be drawn into the gray mass. The pencil may be used in a similar manner.

Chalk-modeling has been largely used in the illustration of this little book. The sketches have in all cases been copied from the blackboard work, and are intended to show the general effects that may be produced by the use of the flat side of the crayon. The pictures are drawn in less than one minute each, with effects requiring much longer time when the attempt is made to reproduce them.

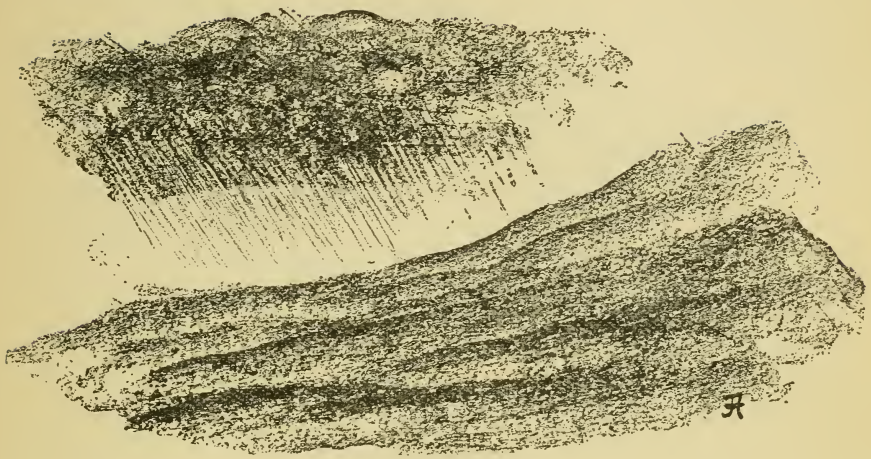


FIG. 8.

Lesson IX.

THE SLOPE.

1. Children mold the side of a hill, or a slope of ground.

2. Let the pupils pour some water down the slope.

Did you ever see water flowing down a slope? In the rain.

Each little rill wears its furrow in the surface.

Uniting, they form a rivulet, and wear a broader and deeper channel.

Where does the rain come from?

But how did the clouds gather rain and let it come down to the earth?

See how muddy the water has become in the little stream.

Did you ever see the pools of muddy water formed in the hollows of the road?

Water flows from a higher to a lower level.

The water carries the fine soil down the slope. Does it take the sand so far? The little rills cannot move the larger pebbles. But the large stream along the roadside may move quite large stones. Where will the mud of the water be left?

Is there a long slope near the school? What kind of soil covers the surface. Do you know what is underneath?

Find some *sand;* some fine *loam* of the meadow. Bring *clay* from the banks of the stream. Here is some *gravel.*

Some day when the dark water is rushing down the slope of the roadway, go out and dip up a glassful of the water. Let it stand all night in the glass. What is it that you find at the bottom?

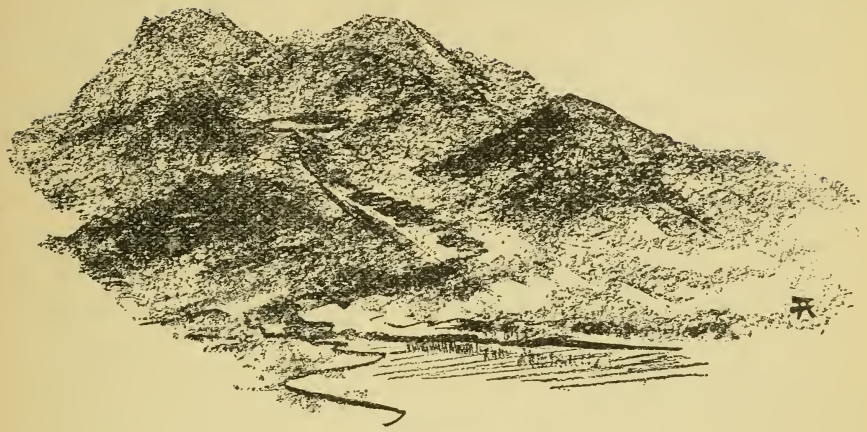


FIG. 9.

Lesson XXX.

THE HILL.

1. The child may now be led to represent the hill by modeling it in the sand.

2. Let him model some hill known to him by name.

3. Call attention to the different kinds of slopes.

4. Show that the hills and valleys must occur together.

How are hills covered? Can you describe White's hill?

What does water do to hills?

How many slopes must the bed of a stream have?

The drops of rain make the *rill*, and the rill its little *furrow*. Rills make *rivulets*, and rivulets make a *gully* in the hillside. *Rivulets* make *torrents*, and these, working with greater force, tear out deep *gorges* in the slopes of the hills.

Valleys in plains are mainly the result of the wear of the surface by running water.

But the great valleys of the earth were formed by folds in the crust.

Such a lesson on local geography is here shown:

Lesson IV.

A Primary Lesson on Hills.

The purpose of the lesson may be to make a beginning in the study of the science of geography, and to engage the young children in the important operation of learning how to observe the facts in nature. To this work the children will be able to bring all their knowledge obtained through previous observation of the earth's surface differences; also their constructive tendencies will be utilized. The teacher should bring to the work her own experiences as a child, her acquired knowledge of child nature, and her personal knowledge of each individual in the class.

"All the little boys and girls in Johnny's class may go to the sand-table and work in the sand until I have finished the number lesson with Charley's class. Let me see how quiet you can be, and what you can do with the sand."

During the lesson in number, the little children to whom permission has been given are busily but quietly engaged in heaping up the sand in piles. After the dismissal of the class in number, and when all the older pupils are provided with work, the teacher passes to the back part of the room and begins the lesson in geography.

"Mabel, what have you been making?" I have been making a sand-pile. "John and Robert have made two large heaps. What do you call yours, boys?" Mine looks like a big hill. This is the hill near grandfather's house. "Agnes has made a hill, too." It is a little hill. A small hill. A low hill. "We will call it a low hill, but what shall we say of this one that Henry has molded?" It is a tall hill. We may call it a large hill. It is a narrow hill. I made it for a very high hill. "Let us call it a high hill. Tell me something about yours, Ida." My

hill is steep. This hill is flat on the top. "Robert, what can you say about yours?" Mine is a long, steep hill like grandfather's hill. It is a good hill to slide down in the winter.

"Did you ever slide down a steep hill?" Tom Jones took me with him. "I would be afraid to go down," says Agnes. "Did you go down on a sled?" "We went down in the old *cutter*, —oh, so fast!" says Robert. "That was not a very safe thing to do, I should think. What made the cutter go so fast, Edith?" The hill was so high and steep. We went down the side of the hill. In the winter, when the snow is on the ground, we may slide down the side of the hill. Water runs down the hill and carries the sand and pebbles along, too. In the summer. "Your sled made a track in the snow when you were carried so swiftly to the bottom. Does the water make a track in the side of the hill? Let us try it on these little hills."

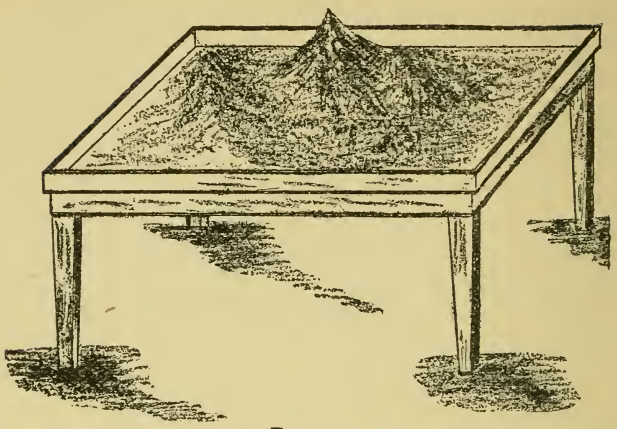


FIG. 10.

Lesson V.

LOCAL GEOGRAPHY.

The large molding-board is covered with a thin layer of damp sand.

Teacher.—Children, you see that the sand on this board is spread out flat; how many of you have ever seen any land which was flat or level? Hands rise.

Charles.—Father's meadow-lot is level.

Henry.—Our sheep-pasture is flat.

Eddie.—Uncle pastures his sheep on the hill back of the barn.

Teacher.—So all pastures are not alike, it seems. Etta, what do we call land which is quite flat and even?

Etta.—A large piece of land which is level or even is called a plain.

Teacher.—Eddie may make the sand in the molding-board look somewhat like his uncle's sheep-pasture. What did he call the pasture, Etta?

Etta.—He said that it was a hill. (While Eddie is working, the other children watch closely. Eddie finishes.)

Teacher.—How did you make the hill, Eddie?

Eddie.—I heaped the sand in a pile, and made it rise a little at a time until it reached this steep place where I have put in these little bits of stone for rocks. One of Uncle Frank's sheep fell over the rocks last spring.

Teacher.—What do we call those places at which the land rises up? Dick.

Dick.—Hills.

Teacher.—How many ever saw a hill as steep as this one which Eddie has molded? (Many hands rise.) Charlie.

Charles.—The hill by Mr. White's house is nearly as steep as one side of that.

James.—Dry Hill is steeper. 'Tis fun to slide down there in the winter.

Teacher.—Annie, what do we call the sides of hills?

Annie.—We call them slopes.

Teacher.—James, what shall we call this slope on the left?

James.—A gentle slope.

Teacher.—And this one on the right, Gertie?

Gertie.—A sharp slope.

Teacher.—Better, an abrupt slope. Eddie, where did the sheep fall over?

Eddie (pointing out the place on the molded hill).—Here, where it goes straight down.

Teacher.—What do we call a place where the slope is not gradual, but seems to go straight down? Florence.

Florence.—I do not know.

Teacher.—Lottie may tell us.

Lottie.—It is called a precipice.

Teacher.—Eddie's uncle pastures sheep on the hill; with what do you think that hill is covered, Dick?

Dick.—There must be plenty of grass.

Eddie.—But there are bushes and young trees, too.

Teacher.—What else do we find on hills, very often? Charles.

Charles.—The top of White's hill is covered with large trees.

Teacher.—James.

James.—Dry Hill has no covering at its very top—nothing but dry rocks.

Teacher.—Here are some little pebbles and bits of stone. James may mold Dry Hill. Eddie.

Eddie.—He must make it near mine, for Dry Hill is near Uncle Frank's pasture.

Teacher.—Yes. Let us call the sheep-pasture Uncle Frank's hill. Now, how does Dry Hill differ from Uncle Frank's hill? Etta.

Etta.—It is much higher.

James.—The slopes are steeper.

Gertie.—It has no grass at the top.

Dick.—The rocks are larger.

Teacher.—Charles may mold White's hill. Here are some spruce twigs for trees. Florence may mold a hill too. James may describe Dry Hill.

James.—The hill is broad and high, and the slopes are steep. The top is dry and rocky.

Teacher.—Eddie may describe Uncle Frank's hill.

Eddie.—The hill is long and low, and is covered with grass, bushes, and small trees.

Teacher.—How does White's hill differ from Uncle Frank's hill?

Charles.—It is larger and higher.

Annie.—The slopes are not so steep.

Florence.—It is covered with trees.

Dick.—And the trees are large.

Teacher.—Charles may describe White's hill.

Charles.—It is a large and high hill, but the slopes are not very steep. It is covered with trees, which are very large.

Teacher.—Hills have many uses. You may not know a great many of them now, but you can tell me some. Eddie.

Eddie.—They are often used as pastures.

Charles.—Lumber is made from the trees which grow upon them.

Gertie.—Papa says that the stones used in building the church came from the side of Dry Hill.

James.—That is so; and I think that the lime used in making the mortar was made by burning some of the same rock.

Teacher.—Did you ever see masons make mortar, James? What was mixed with the lime?

James.—Sand.

Teacher.—Some hills are formed wholly of sand. What is Uncle Frank's hill made of, Eddie?

Eddie.—Dirt and stones, just the same as the one which I molded.

Teacher.—Annie may bring me a cup of water. I pour some water here on the top of this hill. Where does the water go? Dick.

Dick.—It runs down along the slope to the bottom.

Teacher.—Charles.

Charles.—The sand runs along too.

Teacher.—When does water fall upon the real hills, Gertie?

Gertie.—When it rains.

Teacher.—Eddie.

Eddie.—Sand is carried down the real hill, too.

Teacher.—Yes. Water wears away the large hills, just as it destroys this little hill which you molded. Dick, did the water stop when it reached the bottom of the hill?

Dick.—It did not stop, but ran along in a little stream between Dry Hill and the hill which Florence molded.

Teacher.—We will call the little stream "Rocky Brook." Class may tell me how many slopes are wetted by the water.

Class.—Three slopes are wetted by Rocky Brook.

Teacher.—James may name one.

James.—One slope of Dry Hill.

Eddie.—A slope of —— of Florence Hill.

Gertie.—The water ran down the hill which Eddie molded.

Teacher.—Yes, the water always runs along one slope; what are the other slopes for? Lottie.

Lottie.—To keep the water in at the sides.

Teacher.—You must look carefully at all the streams after this. You will always find three slopes. To-morrow we shall study some high hills. They are called——

Class.—Mountains. (*Dismissed.*)

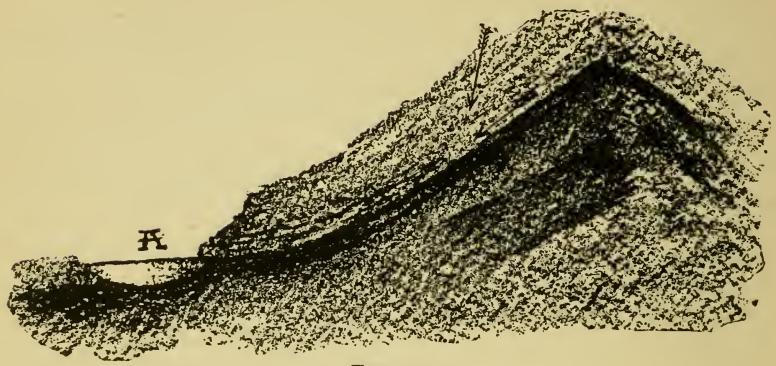


FIG. 11.

Lesson VI.

THE SPRING.

1. The child is allowed to pour some water upon sand, and to find that the moisture soon passes through it.

The water sinks through the sand freely. There are empty spaces between the little grains of sand, and the water readily passes among such spaces.

Sand is loose and porous [**pervious**], and may become like a kind of sponge, filled with the water from the surface of the ground.

2. Let the children pour some water upon a quantity of clay, and find that the tough clay does not allow the water to pass through.

The little particles of clay fit close to each other.

Water cannot pass through the mass of clay.

Clay is **impervious.**

Many rocks are porous, and are also cracked or broken. Water may pass down through the beds of many close-grained

rocks, such as limestone or sandstone, because there are many joints or cracks.

3. The children are allowed to build up a hill of clay, and

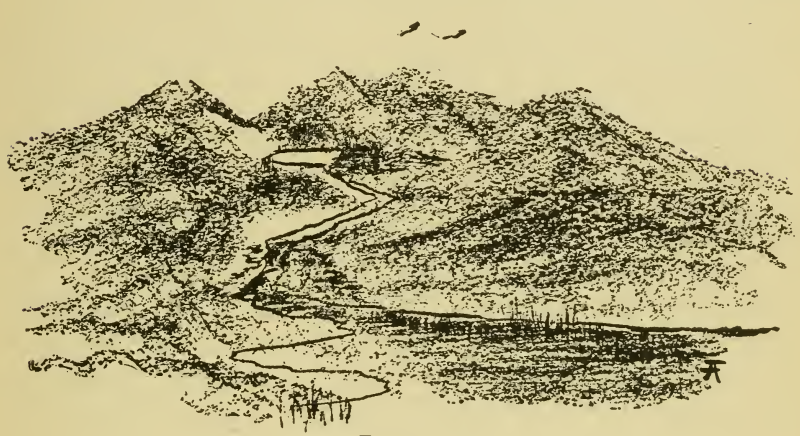


FIG. 12.

make its slopes quite smooth. Then they may cover it with a layer of mixed sand and gravel.

4. At the base of the hill, scoop out a part of the sand down to the layer of clay. Pour the water on the slope at the top, and after a few hours some will be found collected in the little hollow at the base.

5. Where does the rain go?

Some of the rain soaks down into the ground and finds its way through the loose soil and sand, or even between the crevices in the harder rocks, down to the layers of clay. Here it will follow the line until it comes to some outlet at the lower surface, and then gushes out as a **spring.**

When this water does not appear at the surface, we may dig holes called **wells,** and catch the water.

Lesson VII.

A Brook Basin.

The relief form of the school district should be studied through actual observation. Land surfaces consist of slopes, long or short, abrupt or gradual. Model such slopes in sand. Water partings are formed by the meeting of slopes at their upper edges. Find such water partings, mold and describe them. How is the water parting related to drainage? Slopes meet at their lower edges and give valleys and river beds. Why do we find the water here?

Do you know where you can find a brook-basin? Is it large or small? From how far is the water drained into this brook? Why does the water move so fast? So slow? What determines the direction in which the brook flows? The size? Of what use is a brook? Can you describe the banks and the mouth of the stream? Make a sand model of the brook-basin.

The value of the work in molding will be increased if the teacher can give the children the advantage of numerous "Field Lessons" as exemplified on page 52 under "Nature Study." The child will collect the individual details of various observations, and see the mutual relations existing among them. The brook basin will become an intelligible unit of measure in practical geographical study. The work in the open air need not degenerate into mere romping rambles, but must have definite plan and purpose. A successful field lesson is able to give an impetus to the whole school-life of the child. Remember that formal lessons are not absolutely necessary in nature study. Much can be done at odd moments, and the child will often do much more at home than at school. Each ramble in field and in wood becomes a true communion with nature. *Tell nothing that the children can find out for themselves.*

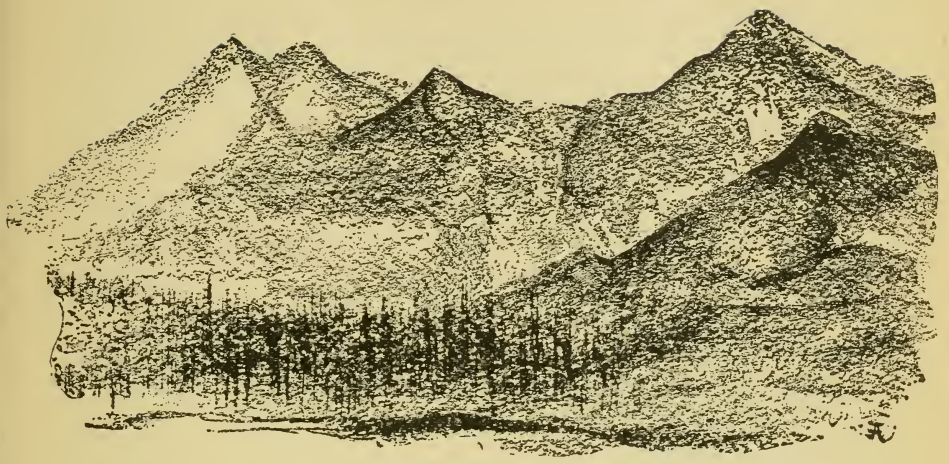


FIG. 13.

Lesson VIII.

MOUNTAINS.

[A good supply of clay or sand should be in the molding-board.]

Teacher.—Lottie, what are very high hills called?

Lottie.—Very high hills are called mountains.

Teacher.—Elevations of land rising less than 2000 feet above the surrounding country are called hills; those 2000 feet or more in height are called mountains. How high is the steeple of the Presbyterian church, Charlie?

Charlie.—My brother Ben says that it is 100 feet high.

Teacher.—How many such steeples would it take to reach 2000 feet into the air? Gertie.

Gertie.—Twenty.

Teacher.—How high the mountains must be As high as twenty steeples, one over the other. Lottie.

Lottie.—I have seen a mountain.

Teacher.—Tell us about it.

Lottie.—Papa and I went to the top of Mount McGregor last summer.

Teacher.—How did you reach the top?

Lottie.—We went up in the cars. It took us a long time to go up to the top, but we could then see the river, and it seemed very near.

Teacher.—What is the name of the river?

Lottie.—The Hudson. Papa said it was not near to us, but was miles away.

Teacher.—Why do so many people visit Mount McGregor? Class. How many know? (Hands rise.) Dick.

Dick.—Because General Grant died there.

Teacher.—Who was General Grant? Lottie.

Lottie.—He was a great Union general, papa said.

Teacher.—Well, what is it, Charlie?

Charlie.—Miss Cameron, I wish you would let Lottie mold Mount McGregor.

Teacher.—Lottie may mold it. (She molds the mountain.)

Lottie.—It is a large one.

Teacher.—When we go up a hill or mountain, where do we begin to ascend? Class.

Class.—At the base or bottom.

Teacher.—You may call that part of the base at which we begin to ascend, the *foot*. Point out some parts of the mountain, Gertie.

Gertie.—This is the top (touching it).

Teacher.—You may call that part the *summit*. What part do you see, Etta?

Etta.—I see the sides.

Teacher.—The sides are often called the *slopes*. Class may name with me the parts of a mountain.

Class and Teacher.—Slopes, base, foot, and summit.

Teacher.—Lottie has finished molding the mountain, and it is well done. Did you see any other mountains?

Lottie. There were others near it.

Teacher.—Who wants to mold one or two mountains near Mount McGregor?

(Every hand up, including Lottie's, although the little girl seems to have changed places with the teacher.)

Teacher.—All of you, of course. Eddie may mold one on this side, and Annie one on the left. Now what shall we have? Class.

Class.—A row of mountains.

Teacher.—Such a line of mountains is called a *range* or chain. Well, little critic?

Lottie.—Eddie's mountain is more like a hill; it should be higher.

Eddie.—I can make it larger and higher.

Teacher.—Yes, I would do so. Most mountains are joined closer together at their bases than you have made these; more like the links of a chain. Dick may now fill in some clay between the mountains.

Dick.—That will make them look like the roof of a house.

Teacher.—Yes, the mountains are the roof of our home, the world. That will do, Dick. Do not fill in too much, but leave the three summits or peaks.

Charles (who wishes to be useful too).—May I bring the water, Miss Cameron?

Teacher.—In a few minutes, Charlie. If I should pour some water on the top, as I did with the hills that we molded, where would it run?

Charlie.—It would run down the two sides of the chain or range.

Teacher.—Can any one tell what the top of this ridge looks like? Gertie.

Gertie.—Something like a roof with the chimneys.

Teacher.—We call the top of the ridge the *crest*. Annie, if you lived on this side of the ridge and Ella lived on the other side, how would you go to her?

Annie.—I should pass between the peaks.

Teacher.—Why?

Annie.—Because it is lower there.

Teacher.—Sometimes these low places or notches become deep furrows down the slopes, and are then called *passes*. You may tell me why, Annie.

Annie.—I suppose because people *pass* through at those places.

Teacher.—Charlie may bring the water, now. (Pouring some on the ridge between the mountains.) You see that this water makes such a pass in our little mountain chain. When a river flows through a mountain chain, the cut is called a *gap* or *gorge*. There are many in this country. Class may tell me what becomes of the water which flows down the mountain sides.

Class.—It forms rivers. (*Dismissed.*)

Lesson IX.

A River Valley.

It is altogether probable that the actual geographical unit of practical study, after the simpler study of the brook basin, will be found to be the *river valley*. Around the valley the elements of geographical life will cluster, and this natural home of man will become the historical unit as well. A true concentration of effort and correlation of study will thus be effected. The special study of a small portion of the earth will be of more value to the student in geography than a less specialized study of extended areas. This is true at least in regard to the earlier efforts in the attainment of such geographical concepts as are necessary to the

Fig. 14.

earnest student of the science. To the pupils in the schools of Western Pennsylvania, the study of either the Alleghany or the the Monongahela River will be of greater value educationally than the study of more distant streams. All of the main facts of physical and commercial geography may be developed and illustrated with little apparent effort, because with the child you are proceeding in a strictly logical manner. The natural historical associations may be brought out in their proper relations, and the whole unit be used as a known quantity by which other units, to the child unknown, may be brought into his mental horizon.

If we work upward and outward in this manner, the final and grander concept of the world itself—as a great valley with its

ocean river, the Atlantic—comes upon the mind, to unify not only the geography, but the history of the world (Fig. 14).

"Rivers are the most important aqueous agents in modifying the surface of the earth. Springs, as they issue into open day, naturally seek a lower level; and numbers of them meeting in one channel form streams, which again join in some lower valley and produce rivers of various sizes. Rivers thus form a species of natural drains by which the excess of moisture that falls upon the land is returned to the sea. They are of all dimensions; in breadth from a few feet to many miles; so shallow that a boy could wade them, or so deep as to float the largest ships. In length of course, they range from forty miles to as many hundred miles."

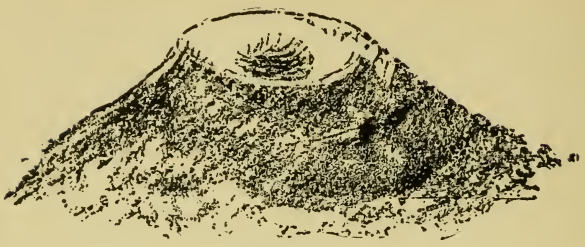


FIG. 15.

Lesson X.

VOLCANOES.—I.

"What goes into the head through the eyes never comes out again."—*German Proverb.*

An Active Volcano.

Procure some molder's clay, and dampen it until it will *pack* when pressed in the hand. Sand or common red clay will do very well in place of the other, but molder's clay is cleaner. Pulverize an ounce of chlorate of potash, and then mix it thoroughly with half an ounce of dry white sugar. Procure a small quantity of sulphuric acid (H_2SO_4).

Now build up a small pile of the clay, and scoop out from the centre a part, as in this figure. (Fig. 15.)

Put a piece of paper, about four inches in diameter, in the bottom of this hole; then put in the mixed potash and sugar.

Take a pencil or pen-holder (Fig. 16), and run it through a circle of paper about as large as the first one; press it down upon the mixture. Pack the clay carefully down upon the paper and about the pencil, turning the pencil around now and then in order that it may be removed at last.

The volcano will now be complete (Fig. 17), with the mixture

three or four inches from the top, and a clear hole leading down to it.

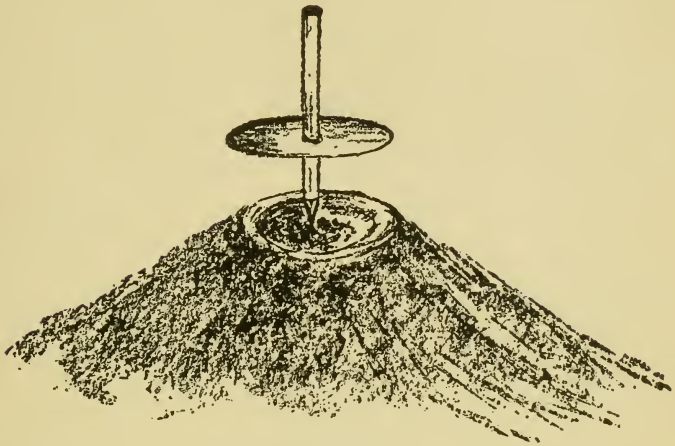


FIG. 16.

To light the volcano, take a long straw or a piece of glass tubing and drop a small quantity of the sulphuric acid down the hole.

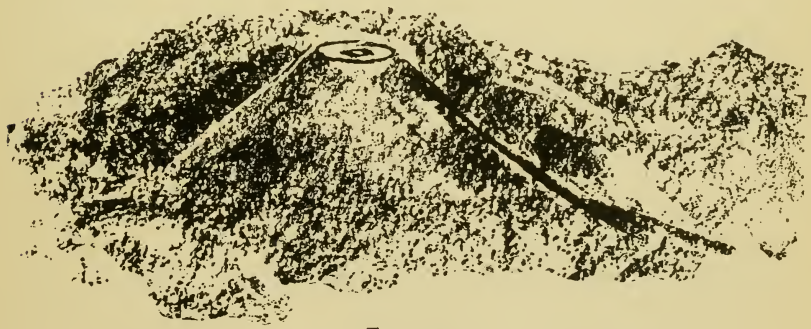


FIG. 17.

Do not look into the hole to see about the eruption. It will generally occur in a minute or less after the acid is poured in. If it does

not *go*, put in more acid. A *very little* cold water, added to the acid just before it is used, will generally expedite matters. Try a little of the mixture in a shovel before you build a volcano, and the acid can thus be adjusted. With the ordinary commercial sulphuric acid, however, no trouble should be experienced. Sometimes the acid is too strong, and should be diluted by pouring some of the acid into a small quantity of water.

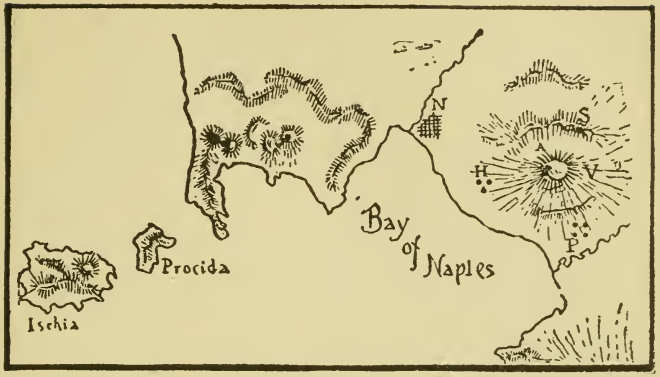


FIG. 18.

Lesson XX.

VOLCANOES.—II.

Vesuvius, A.D. 79.

Model upon the molding-board the details of Vesuvius and its surroundings, including the bay of Naples and the Islands Ischia and Procida. After the volcano has been prepared according to the plan before given, mold the ridge S, of Mount Somma the companion peak as seen from Naples (N). Pieces of blue string may be laid to represent the streams upon which Naples and some of the other towns are situated (Fig. 18). Naples may be represented by a square of colored paper, and the buried cities Pompeii and Herculaneum by stars or triangles cut from paper of a different color. The modeling should be done while the attention of the class is held at each point, the teacher placing the pieces of paper in position, or allowing the children to place them according to instructions. Following will be the lesson somewhat in detail:

The teacher asks questions about the shape of volcanoes, and develops the difference between mountains and volcanoes. These "send out fire, smoke, and ashes from the top." Yes, John is right, "sometimes hot stones, gases, steam, and lava are thrown out too." And Mabel says that these "do not always come out at the top, but may sometimes burst out at the sides." Can any of you tell me what *lava* is? Yes, "melted rock." Did you ever see any? Here are three pieces. This hard piece John's "father brought from Italy," and here is a softer piece which came from Iceland. But James "found this soft, light piece down in Mr. Grove's marble-shop." It is so light that it will float on the water. "Mr. Grove said it would float, and that it was used to polish marble." Yes; what did he call it? "Pumice." Most pumice-stone comes from the Lipari islands, where there is a hill of pumice 1000 feet high. (Find these islands on the map, and to-morrow tell me where they are.)

Where is the volcano Vesuvius, Charles? "In Italy, near the Bay of Naples." Very well. More than 1800 years ago there were two very beautiful cities just at the base of Mount Vesuvius. They were just here at the foot, one where I put this blue paper star (P), the other where I put my finger. Mabel may put the red star there (H).

One bright day the people in these cities were working away. The soldiers were on guard at the gates; the baker was baking bread; the miller was grinding wheat; the tailor making clothes; and some of the ladies were combing their hair with queer little combs of bone, and looking into little hand-mirrors of polished steel. Suddenly Vesuvius sent out streams of lava and clouds of ashes, and the two cities were buried out of sight. (The modeled Vesuvius may be ignited now.) Our little hill of fire was not much like the great mountain in power, but the fire came out somewhat as it comes from Vesuvius.

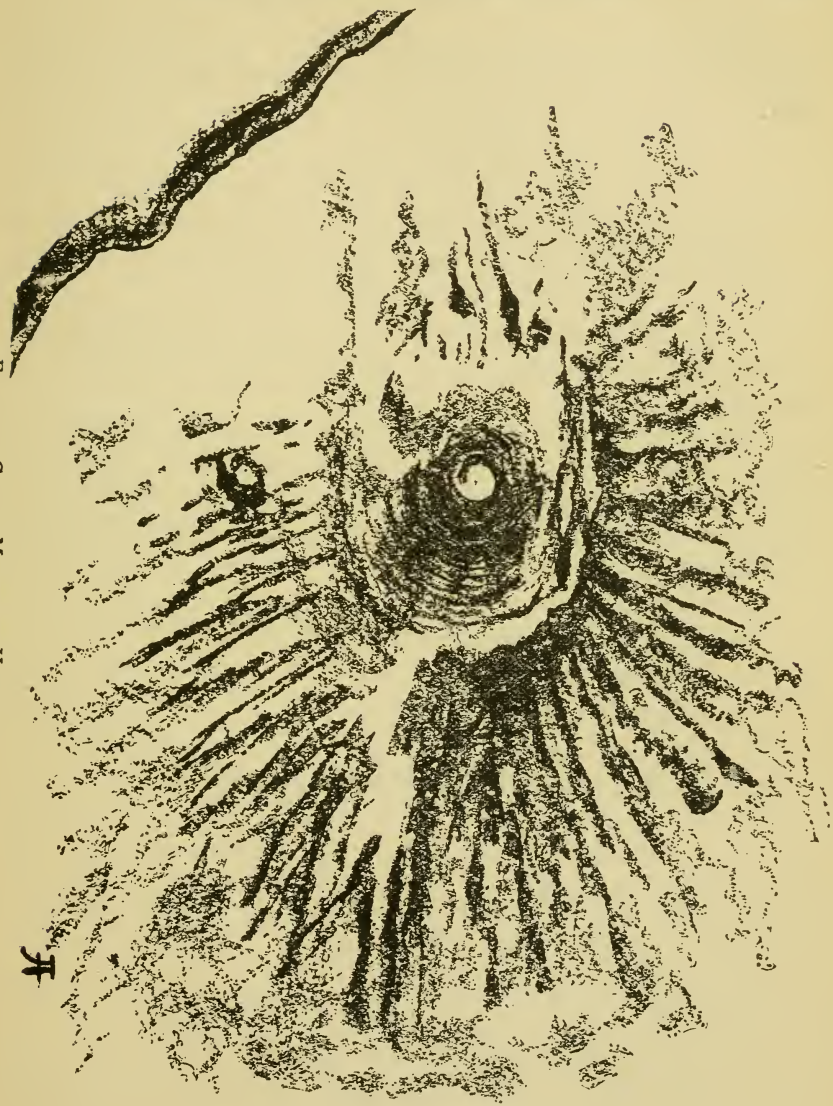


FIG. 19.—CHALK MODEL OF VESUVIUS.

Would you like to know the names of the two cities? Here they are upon the blackboard, and you may all repeat them with me:

POMPEII.

HERCULANEUM.

What a strange word the first is, with two *i*'s at the end. Not many words are like that. Let us pronounce it:

Pom-pa'-ye.

This city was partly uncovered some years ago, and travelers can now go into many of the houses in which the people lived so long ago.

Can you tell me the name of a modern city near Vesuvius? Yes, "Naples." Let us make a little outline upon the board. Charles may write the names of the two buried or dead cities; James, the modern city; and Jennie the names of the volcano and country.

POMPEII,
HERCULANEUM, } *Buried or dead cities, 79 A.D.*
NAPLES, *Modern City.*
VESUVIUS, *Volcano.*
ITALY, *Country.*
LIPARI ISLANDS, (?) *Answer to-morrow.*

Lesson XXX.

VOLCANOES.—III.

Teacher.—How many can tell me something about the Lipari Islands?

Several of the pupils mention the points which they learned in the preceding lesson.

Etta.—I asked brother Tom to show me where to find them, and he told me to look on the map of Europe, a little north of Sicily.

Teacher.—That is right. Point them out upon the map, Etta. James.

James.—Father says that we get currants and figs from some of these islands.

Teacher.—Yes. I am glad that your parents and brothers are so much interested in your work. Some of the islands produce many fruits. One, however, is a volcanic cone in the midst of the sea. It is called Stromboli, and has been constantly in eruption for more than 2000 years. Helen, can you tell me the name of the sea which surrounds this volcano?

Helen.—The Mediterranean.

Teacher.—What two grand divisions does this sea separate, Charles?

Charles.—The Mediterranean separates Europe from Africa.

Teacher.—Hope may find on the large map another sea which separates two grand divisions.

The pupil points to the Red Sea; and thus the Caribbean Sea and the East Indian Seas are successively found. If the dividing seas of Asia and Australia are not seen as such, the teacher calls attention to them.

Teacher.—Dick may name the largest ocean.

Dick.—The Pacific.

Teacher.—Now, most of the volcanoes of the world are in the Pacific Ocean, or near its borders, and nearly all of the other volcanoes are in these middle seas, or very near them. Indeed, the Pacific has been called *the sea of fire.* Can you tell me why, Gertie?

Gertie.—Because it has so many volcanoes.

Teacher.—I will write on the blackboard an outline, and you may copy it into your blank-books afterwards, but do not forget what it means.

I. VOLCANOES ARE FOUND:

1. *In the Pacific.*
2. *Along the borders of the Pacific.*
3. *In the Middle Seas.*
4. *A few in the other oceans.*

Lottie may tell us the names of three volcanoes in the Mediterranean.

Lottie.—Vesuvius, Etna, and Stromboli.

Teacher.—When you find the names of more valcanoes as you study geography, you may write them in your books in the proper place. Thus:

II. Volcanoes in the Mediterranean (Middle Sea).
1. *Vesuvius.*
2. *Etna.*
3. *Stromboli.*

I will now show you something about one of the gases sent forth by volcanoes. (Fig. 20.)

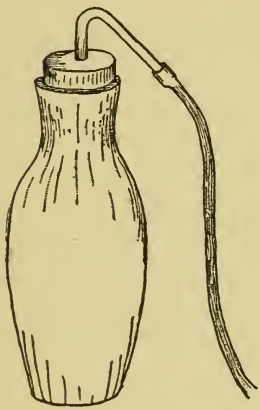


Fig. 20.

The teacher here puts some small pieces of marble or old mortar into a common pickle-bottle, and fits into the mouth of the bottle a cork through which a piece of glass tubing has been pushed. A short piece of rubber tubing is fitted to the glass tubing. The cork with its tubing is then taken out, and a gill of mixed sulphuric acid and water is poured over the marble. The teacher replaces the cork, and then collects the gas by inserting the rubber tube into the mouth of another bottle. (The apparatus may be prepared by one of the bright boys. Try one.)

James may light the candle. Now pour out the gas directly over the flame. Class, what has happened?

Class.—The gas has put out the candle.

Teacher.—Why could James pour the gas down upon the candle, Lottie?

Lottie.—Because the gas is heavier than air.

Teacher.—I have now collected some more of the gas. Charles may pour this clear lime-water into the bottle of gas. What change has taken place, Dick?

Dick.—The water is now white.

Teacher.—This gas is called carbonic acid gas, and may be detected by its power to turn clear lime-water white. Here is a tumbler filled with lime-water. Florence may blow through this glass tube into the water.

Helen.—Oh, it turns white!

Teacher.—But is Florence a little volcano? The same gas is given off by the lungs. We shall learn more about this in Physiology. You may copy this sentence:

Some volcanoes send forth carbonic acid gas, and the same kind of gas is exhaled by animals.

Class may take Lesson XVI., subject, "Mountains and Mountain Ranges." Turn to the map of South America, and learn the names of the principal ranges. Locate the volcanoes.

Lottie.—I have found one already.

Nature Study.

There should be a series of lessons upon the character of the surface, the relation of slopes, brook basins, river basins, valleys, hills, and the other ways in which the correlation of form and geography is manifested. It has been said that a grain of sand is a thought of God. We need not call the attention of the child to the distant and seemingly more marvelous things in nature before he gains some knowledge of the marvels under his feet. The real miracles lie nearest at hand. Let him study the sand, the gravel, and the clay. How were these materials formed, whence were they derived, and by what means were they laid down in their present position? How came the different rocks to occupy their places in the earth? Are there any changes now going forward on the face of the globe? Study the action of brooks and rivers as they bear away the mud, the sand, and the gravel in one place, and deposit them in another. Do not the rains and frosts, the winds, and other agents act upon the solid rocks of the earth, and make them crumble down, thus forming new soil? Open the eyes of the child to some of the wonders that lie all around him. Perhaps we may not be able to teach them to "see nature," but we can lead them so that they may not lose the love of nature they already have. Every child has a quick eye for the curious and interesting things in the fields and woods. Keep up the curiosity of the child, and let the *interest* —that Herbartian basis of all success in teaching—keep well ahead of the knowledge. Encourage the children to bring to you whatever to them seems curious and interesting from their

walks in the fields and woods. A well-known naturalist has said: "One throb of love of nature which you can awaken in the child's heart is worth any number of dry facts which you can put into his head."

> "O Nature, gracious mother of us all!
> Within thy bosom myriad secrets lie
> Which thou surrenderest to the patient eye
> That seeks and waits."

STUDIES.

(Specimens of children's work in Model School.)

The work here given is by the pupils of the Practice School of a State Normal School in Pennsylvania. The ages range from eight years to ten years. The lessons concern that which may be presumed to be most familiar to the children—their own locality.

An Observation Lesson.

Watching a Crane.

Paul and Carl went to spend an afternoon playing along the creek. When they came within sight of the water, they saw a large bird standing in the water near a large rock. "Oh look," said Paul, "there is a goose standing in the water." "Where?" said Carl. "Don't you see it over there by the large rock?"

FIG. 21.

"It must be asleep for it stands so still."

PEARL WATSON, 8 yrs.

(Fig. 21.) "It must be asleep, for it stands so still." "Oh, I see it now; but it is too large for a goose. See its long legs and neck. It is too tall for a goose." "Oh, yes," said Paul, "so it is. I wonder what bird it is, and why it stands there on one foot." "I think it is looking down into the water after something." "It can't be a goose, or duck, or chicken," said Paul. "I believe," said Carl, "that is the same kind of a bird my father shot somewhere along Wolf Creek one day. It was very tall, and he called it a *crane*." "Oh see," cried Paul, "it has caught something and has it in its mouth. I thought the bird was asleep, but it must have been watching for what it has just caught." "The bird has caught a young frog," said Carl, "and it is about to fly away." The crane became frightened, and flew away as the boys came up. It went to some place where it could eat the frog in peace.

The Study of the Common Rocks.

Lessons should be given on minerals, including soils, dust, common rocks, metals, etc. The child must be taught to grade the various substances in regard to common properties, such as color, touch, weight, hardness, etc. For instance, under the latter, the judgment is cultivated by estimates based upon comparative degrees of hardness of certain substances, others being taken as standards.

SCALE OF HARDNESS.

No. 1. May be readily scratched with the *finger nail.* [Clay, etc.]

No. 2. Is not impressed with finger nail; but does not scratch a plate of *copper.* [Rock salt.]

No. 3. Scratches a piece of *copper*, but does not scratch *glass.* [Limestone.]

No. 4. Scratches *glass*. [Quartz, sandstone, etc.]

No. 5. Would scratch *quartz*. [Diamond.]

The pupils are encouraged to collect specimens of the common rocks, and to attend to the proper labeling of the various pieces of rock, etc. Under this head coal is studied, although of vegetable origin. Drawings of all important specimens should be made.

Quartz.

Quartz is very hard, and will scratch glass easily.

There are many kinds of quartz. I know six kinds. There are crystal, milky, smoky, glassy, flint, and moss agate.

Smoky quartz looks like smoked glass.

Milky quartz is almost pure white.

Glassy quartz looks like glass, but is much harder.

Some flint looks like ashes, because it is gray.

The crystal is very clear and beautiful.

Quartz is the hardest of the common minerals.

Granite.

Three minerals are found in common granites, and they are *quartz*, *feldspar*, and *mica*.

I can find the hard quartz in the granite.

Mica splits into very thin layers. I can pick up the scales with the blade of my knife.

This mineral is used in the doors of the stove to let the light shine through.

I cannot scratch the quartz with my knife, for the mineral is harder than steel.

Steel will make a slight impression on feldspar.

I can see the edges of the crystals of feldspar.

This piece of granite has cream-colored feldspar, but the mineral is often red.

Granite is a fine building stone.

True granite is not arranged in layers. It is unstratified.

Gneiss is a rock resembling granite. It is a stratified rock.

Sandstone.

Here is a piece of sandstone.

It is formed of small grains of quartz. The little grains will scratch glass.

Some of them are quite sharp, but some are rounded and dull. They are really very small pebbles.

This sandstone has a yellow color, and is streaked with rust marks.

There is iron in this rock, and such sandstone is not good for building purposes.

Here is a fine gray stone brought from Berea, Ohio.

It is a fine sandstone of excellent quality.

Grindstones are made from fine sandstone.

Sandstone is found arranged in layers.

Hornblende.

Here is some hornblende.

It is dark like the black mica, but will not scale off when I test it with my knife-blade.

This hornblende is greenish black in color.

The *streak* of this mineral is pale bluish green.

There is some quartz in this other rock besides the hornblende.

I can find, also, some feldspar.

This rock is *syenite*, but quarrymen call it granite. It came from Quincy in Massachusetts.

Limestone.

Here is a large piece of limestone.

It has no grains like those of the granite and gneiss.

The knife will scratch the stone.

This piece of the stone is very soft, but some kinds of limestone are hard.

There are some shells in this piece of limestone.

Lime is made from this kind of stone. Mortar is made of lime and sand.

When I poured some acid upon the limestone, white bubbles were formed on the top of the stone.

We call this action *effervescence.*

Limestone is a very useful kind of rock.

Marble.

Marble is one kind of limestone.

This piece is white, but there are many kinds of marble that are not white.

Marble is used for monuments, mantels, and the most beautiful buildings.

Sculptors use fine white marble.

Some kinds of marble are gray, blue, black, or red.

A Lesson on Coal.

In the work of this lesson, specimens of the different kinds of coal were brought into the class-room by the pupils. A general talk between teacher and pupils developed the appearance, uses, kinds, modes of obtaining, and other facts concerning the substance. A few experiments were performed to show how gas and coke are derived from coal. A common clay pipe was filled with soft coal, and then the top of the bowl was covered with clay to prevent the escape of the gas. This was then heated, and when the gas began to escape through the stem, a lighted match was applied. The alcohol lamp was used to furnish the heat necessary. After the gas was burned, the bowl of the pipe was broken, and the *coke* taken out.

Some facts to be brought out in the lesson are:

1. Pennsylvania is the Great Coal State.

2. Two principal kinds of coal are anthracite (Fig. 22), and bituminous (Fig. 23).

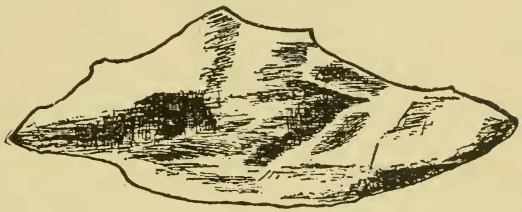


FIG. 22.—ANTHRACITE COAL.
ALICE WILSON, 10 yrs.

3. Anthracite coal is found in eastern Pennsylvania and in Rhode Island.

4. It is much harder than bituminous coal.

5. Sulphur is often found in bituminous coal, and causes the yellow streaks in some coal.

FIG. 23.—BITUMINOUS COAL.
CLARE LEIGHNER, 9 yrs.

6. Cannel coal (Fig. 24), burns with a very steady flame, and, indeed, was first called *candle coal* from this cause.

7. Some coal contains much shale and slate.

8. Coke is made by burning good bituminous coal in ovens.

9. It is a most valuable fuel for use in furnaces for the making of fine grades of iron and steel.

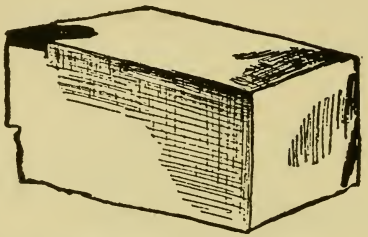


FIG. 24.—CANNEL COAL.

CLARENCE KIESTER, 8 yrs.

10. Many coal products are very useful.

11. Coal is composed largely of *carbon*, of which *graphite*, used in making pencils, is a purer form.

12. Diamonds are pure carbon.

A Field Lesson.—I.

When Agassiz held the greatest American school of science on that little Island of Penikese off the south coast of Massachusetts, he stated vital truth when he said, "Study nature, not books." So, also, in his reply to the publisher, "It is not school-books we want, but students," he showed the crying need of a return to natural methods in the acquisition of true scientific knowledge. To the teacher of geography the open book of nature is the best text-book to use in rendering children familiar with many geographical terms, and giving primary notions which may be expanded through the exercise of the natural modifying imagination.

Results obtained from field lessons will depend in a great measure upon the degree of school spirit kept among the children during the work. Children are apt to be led aside from the lesson, and the teacher must have very definite *purpose* in order

to give effective instruction in the field. The study of a brook and its basin was the object in view in the lesson here reported, but rain interfered with the comfortable completion of the work. Still, this may have fixed certain ideas concerning rainfall. Observations were made during one hour. The children were told:

1. To keep *sharp* and *open* eyes,
2. To note in their blank-books things seen,
3. To draw pictures of subjects observed,
4. To trace the brook in its course,
5. To make a written report next day.

From the mass of reports handed in at beginning of class-work next day the following observations have been selected:

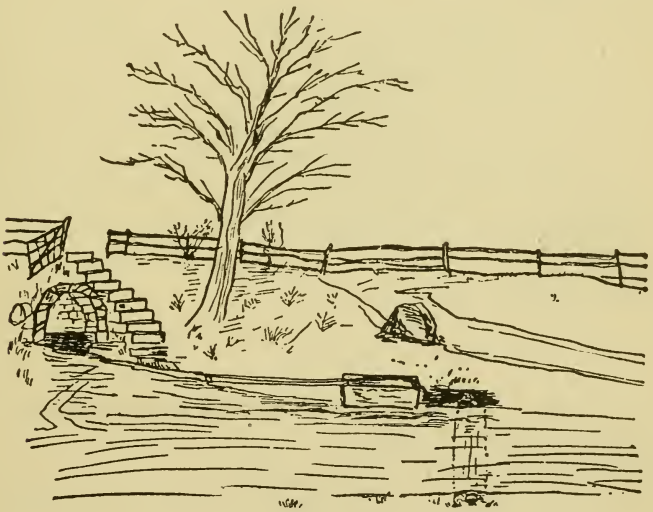


FIG. 25.

There are three slopes forming the basin of the brook.
The source of this brook is a large spring.
The source of the brook, Fig. 25.

The spring is walled about, and supplies a watering-trough with pure, cold water.

Mr. Grine owns the spring.

The brook crosses the road, and runs through the fields into the woods.

It is joined by a smaller stream that rises in a swamp, and by another which rises in a small pond.

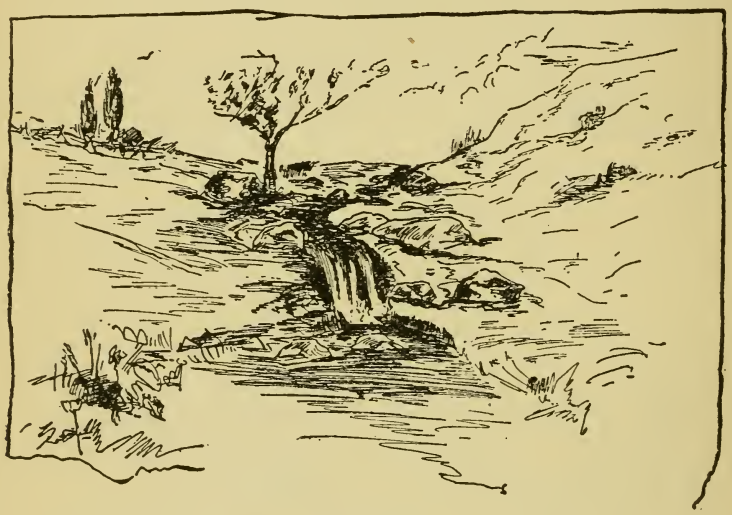


FIG. 26.

In some places the brook flows through swampy land, and in others through rich brown land.

We saw a farmer ploughing the land.

Corn was planted in that field last year, but this year the man said he would plant potatoes.

Farmers do not plant the same crops in a field each year.

The brook gives plenty of good water to all the plants of the field.

The raindrops fall upon the dry ground, and we do not see where they go.

Once we lost the brook itself, for it went under the ground for a long distance.

But we could see the green grass over it, and so we still followed it.

Soon we found two places where the water came bubbling out of the ground, and the brook ran on and on.

When the raindrop falls upon the ground, it soaks through the spongy soil and joins other drops to flow into the brook, or to come out at the spring.

In the woods two brooks came together and formed one large stream.

We went into the woods, and saw the falls of this stream. (Fig. 26, "The Falls.")

The stream divided below the falls, and we saw a small island.

A large tree had fallen across the stream and made a fine bridge.

The boys and girls crossed the brook by this bridge.

In the woods the banks of the stream became steep.

Soon the rain came down very fast and we started home.

We saw streams of water running along the road. When the rain cannot soak into the ground, the water runs off along the top.

There was some sand in the brook, and many small pebbles. The pebbles were smooth and rounded.

The water in the brook soon became muddy.

We could not trace the brook any farther than the falls, because the day was very unpleasant. But we did not loose our fun.

The flowers looked up at the rain.

We leave to the teacher the working-up of the material obtained for language-work, geography, etc. On some pleasant afternoon we shall go farther down the stream. The pictures are by a lad of fourteen and a girl nine years of age.

A Field Lesson.—II.

[CHILDREN'S REPORT OF THE SAME.]

The children were taken out by their teachers for a geographical ramble or "Field Lesson." The purpose was the tracing of a brook from source to mouth. Rain interfered with the completion of the work, but some data of importance were obtained. Written reports of observations made were the order for next day in the language classes; while in the geography class, tabulated statements of the points noted were written upon the board. Pictures drawn in pencil were made *from the rough field sketches of the note-books.*

Our Walk.

When we went for our walk, we saw a farmer plowing his field to plant corn. After a while he stopped, and leaned upon the handle of the plow. An old man and a little boy were standing by the fence watching the man plow the field. A basket of potatoes was near by. The potatoes were cut into small pieces, ready to be planted. We walked along the road and soon came to a new house and barn that some men were still working at. We stopped and talked about what the men were doing. They were carpenters and painters. Then we went down the road, over a large hill, until we came to a large spring belonging to Mr. Grine. The spring was walled about with stone (Fig. 27). The water ran out of the spring, down a trough, and into a large watering-trough. Then it went across the road, under a bridge, and into the field. The water ran through the field under the fences, and we followed it a great distance down. The brook ran through another plowed field, past an old tumble-down barn. Here the brook ran under the ground, and we could only follow it by the green grass above it. There were many trees near the

barn, and the brook ran into the woods. Nearly all the trees were very large and old. After awhile we came to a place where the stream divided into two parts and formed a small island.

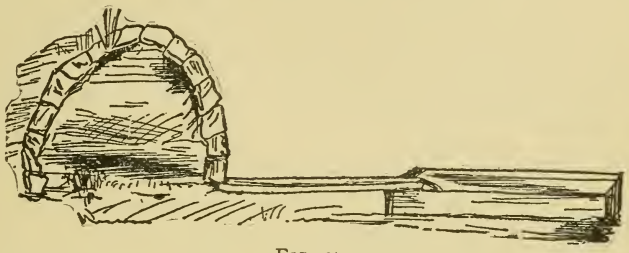


FIG. 27.

"The spring was walled about with stone."

ALICE BARD, 8 yrs.

The girls ran along the left bank of the stream, and nearly all the boys along the right. We were going from the source to the mouth of the brook, so we were on the left-hand side going down-

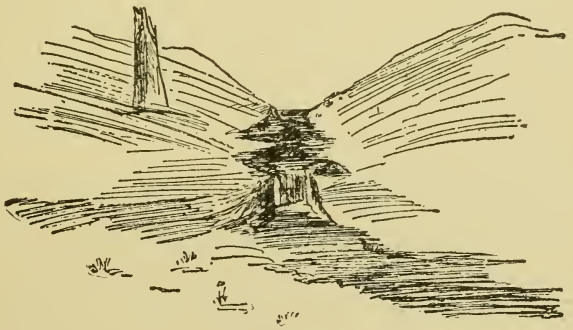


FIG. 28.

"The water came down as a water-fall."

KATE BARD, 10 yrs.

stream. The boys found a place where the water came down as a waterfall (Fig. 28). There was a log lying across the brook,

and we crossed over upon it. Up the hill there was a large old tree that had fallen down upon the ground. The rain came down, and the boys crawled under the log to keep dry. We girls stayed down by the falls, and held umbrellas over us. When we started for home it began to rain harder, and the water ran in streams along the road. We enjoyed our walk, but if it had not been for the rain it would have been more pleasant. Our teachers went with us.

EDNA MCCALMONT, 12 yrs.

The Great Father of Waters.

The following lesson was given by MARY L. SMITH, a senior in charge of the third and fourth grade classes in Geography. The report is largely her own, being made from the data furnished by her *lesson-plan* and her verbal report of the answers obtained during the lesson. The children range from nine to eleven years of age.

Motive.—To give and fix in the mind of the pupils a picture of the Mississippi river and its branches.

Lesson.—1. The surface of North America was rapidly reviewed, emphasizing the eastern and western slopes.

2. Pupils at the board and at seats were asked to represent their ideas of hills and of slopes; then of two slopes and a valley between. What do we always find in valleys? Do you know of any valley without a stream of water? Now make a very wide valley with one slope higher than the other. James may mold the slopes and valley in the sand on the molding-board. Those at seats and at the blackboard may draw the picture (Fig. 29).

3. The tendency of bodies to roll down-hill was discussed. John, if you were on this slope with a basket of apples, and Paul were on the other and had a bucket of water and a basket of stones, and both of you should empty the baskets and bucket, what would happen? "The stones, apples, and water would travel down-hill." "Until they came to a level place." "Some would run down faster than others." Suppose Rosetta and Edna

should start some other little travelers? "The same thing would happen."

Now I know of a great many little travelers whose home is higher than the mountains. Very, very often the houses in which

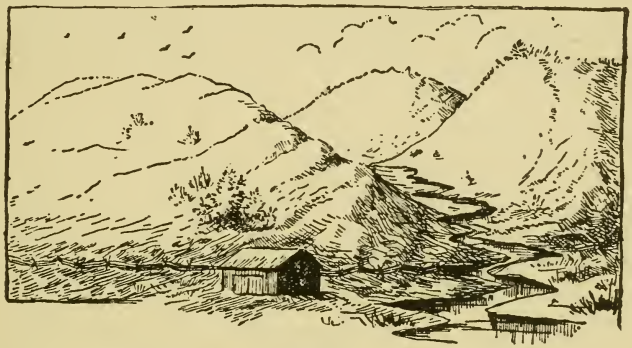


FIG. 29.
"Two slopes and a valley between."

they live refuse to hold them any longer, so down they come to the earth. "Do a great many fall upon the slopes?" "Yes, Charles. Now what happened to the stones and apples?"

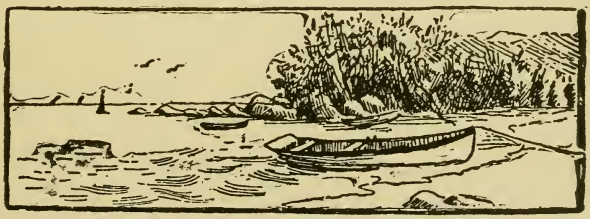


FIG. 30.

"They rolled down the hill slopes." In just the same manner the little travelers that I am thinking about came tumbling one over the other until they reached the valley below. Now how many know the name of these little travelers? "Drops of water."

"Home in the clouds." "No drops like to stay alone." "They flow together and wash out gullies in the hills." "They unite and form springs, brooks, creeks, and rivers." "The farther the streams run, the larger they grow." Now what is the name of this stream? "Mississippi." The Indians called this river *Mishi*—great, *sipi*—river; or the GREAT FATHER OF WATERS. One little stream touches another stream, then both join another. We

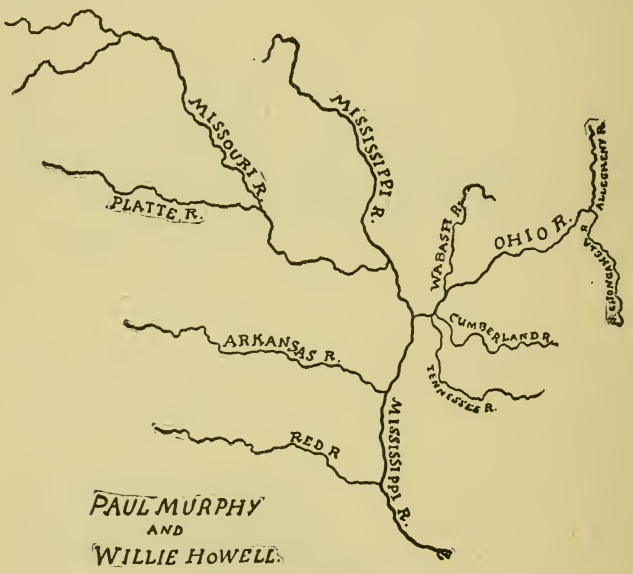


FIG. 31. (From Memory.)

might say one stream catches the hand of the next until all gather around old father Mississippi and give everything to him. "Like little children coming to their parents." Suppose the smaller rivers should stop bringing water to the old father river. Let us look at the map of the river. Take your books. "A whole family of rivers." Yes, that is so. Here is the "Old Father of Waters." "The grandfather." And the Missouri, the

Arkansas, the Ohio. "Sons and daughters." "Children of the Mississippi." We shall call them children. And these two which form the Ohio? "The Monongahela and Alleghany." "Grandchildren."

The pupils now seem pleased to speak of the Mississippi river system as a grandfather with his children and grandchildren.

4. Books are now closed, and each pupil takes paper and draws from memory the picture of the river system as it appears upon the map (Fig. 31).

Questions by the teacher and pupils follow, such as "How many children live west?" "How many east?" "Name them." "Down which slope do they run to their father?" "Name all the grandchildren who live on the east." "On the west."

From the School-yard to the Stars.

An old Mexican engineer said, "You may carry me blindfolded to any part of the earth's surface, and leave me there with two sticks and a bit of looking-glass or a mirror, and I will determine accurately my location in latitude and longitude." School-teachers are not engineers, and may not see readily how such results could be reached, but the old Mexican was right as to the utility of seemingly insignificant things in the truly scientific observation of phenomena.

Long before the solar compass and the other appliances of modern surveying were brought into use, the Romans used very simple means for finding the meridian line and laying out the streets of their cities. It is to an application of these means to the study of geography that we invite the attention of the teachers in our schools.

It is in general granted in the study of geography that the beginning should be made at home; that is, we should go from

the known to the unknown. Teach the child that the meridian of any spot upon the earth can be found; in fact, may be made as definite in direction as any road, street, or line-fence (Fig. 32).

Take a straight stake and nail to it a piece of tin having a circular hole near its center. Tie a stone to a long string and fasten this plumb-line to the tin through the hole, which should be about three fourths of an inch in diameter. Go out upon the

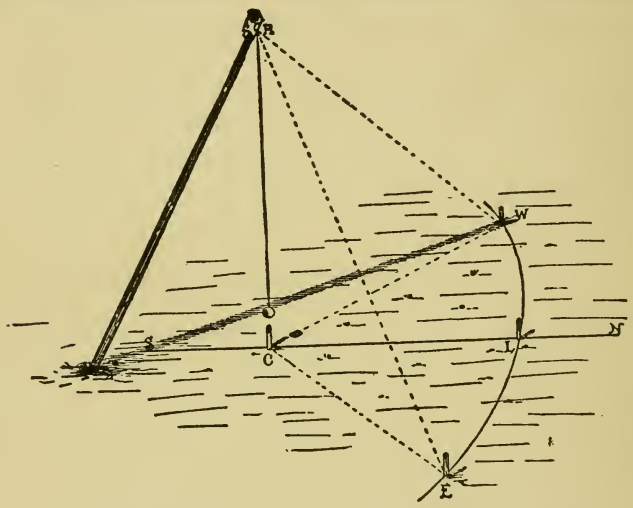


Fig. 32.

playground in the forenoon, and, facing the shadow on level ground, drive the stake into the earth, inclining somewhat toward the shadow. Put a peg, *C*, directly under the plumb-line, and also drive one, *W*, into the ground just where the light through the hole in the tin strikes upon the ground. Note the time until noon—say one hour. At noon return and put another peg, *L*, where the light comes through the shadow of the tin. At one o'clock in the afternoon put a peg, *E*, where the light strikes at that time. The line *C L* is a north and south line or meridian,

and, if *E* and *W* be joined by a straight line, we shall have a line running east and west. If the work is carefully done, *WL* will be equal to *EL*.

Where the place is far from the standard meridian, *local time* should be calculated and used. How could the practical work of the problems in longitude and time given in our arithmetics be better illustrated? Thus, near Pittsburg, in finding a recent meridian laid down by a group of students, the longitude 80° west was taken from the geography; and since the clock was keeping standard eastern time (75th meridian), the difference in longitude was 5 degrees. Since one degree of longitude marks 4 minutes of time, 5 degrees would show a difference of 20 minutes, and local noon would not come until 12 : 20 P.M., standard Philadelphia time. At 11 A.M., standard time, the peg was put at *W*. Then one hour and 20 minutes afterward, or at 12 : 20 P.M., the peg *L* was placed and the meridian *CL* secured. At 1 : 40 P.M. the peg *E* was placed, and the meridian checked by comparing the length of *EL* with *WL*.

By such means a good meridian line may be obtained, and it will be exactly true if made June 21 or December 22. At other times, if greater accuracy is desired, the amount that the sun is "fast" or "slow" may be found from the almanac, and proper allowance made.

At all times very good results may be obtained by putting the stake upright, and, without any plumb-line or perforated tin, noting where the end of the shadow strikes at noon. A line drawn from the foot of the stake to the end of the shadow will mark the north-and-south line; that is, the shadow will be on the meridian.

If the windows open toward the south, a good north-and-south line can be found by continuing the path of the beam of light passing through the window at local noon. Draw a line upon the floor to mark the position of the meridian (Fig. 33). If teachers

would devote a portion of their time to work of this kind, we believe that the pupils would obtain much better ideas of direction

FIG. 33.

and distance. Allow the children to determine the direction of the common roads (Fig. 34), and to mark upon the maps which they construct the changes in direction which such roads make. It is remarkable what progress in accurate work the pupils will make under such instruction. We have in mind the animated looks of a large class of boys when they were told by their teacher that we would learn the table of Surveyors' Measure by actual practice in the field. The following Saturday was named for the exercise. Promptly at the time appointed every lad appeared; and no band of U. S. engineers ever worked with more energy than did that class of practical geographers. They surveyed

lines, measured distances, estimated areas, and calculated the height of trees from the shadows; and if they did not then pass to the study of Polaris, the north star, it was not the fault of the boys. None of them afterwards could be puzzled by questions about units of length, surface, and direction. The relation be-

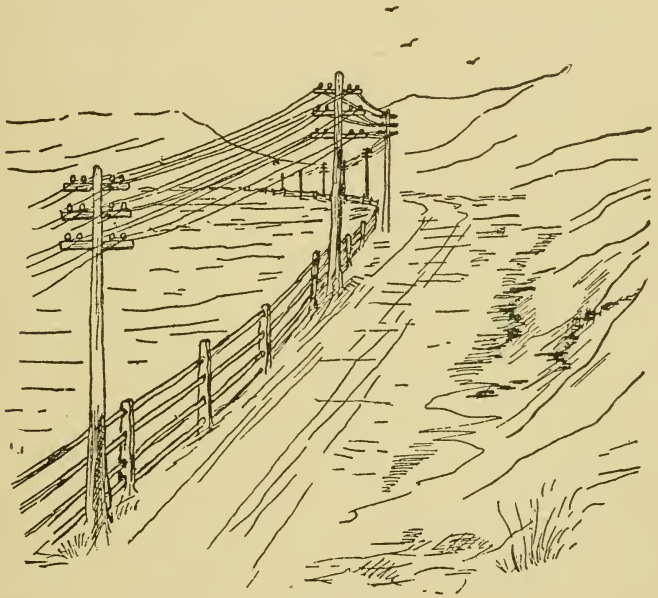


FIG. 34.

tween Surveyors' Measure and Long Measure was discovered; and when we took up Cubic Measure, they calculated the cubic capacity of all things, from the corn-crib to the wash-tub, either in cubic feet, bushels, or in gallons.

Costly apparatus may not be within the reach of the teachers in our common schools, but in reality the simplest apparatus is best. In these days we can afford to disregard the sneer at "home-made apparatus" so plainly marked in a recent educational journal.

Advanced Work in Sand Modeling.

MODELING NORTH AMERICA, BEGINNING WITH ITS PREDOMINANT MOUNTAIN SYSTEM. (See Frontispiece.)

In the hands of the skilful teacher, the possibilities of sand modeling in giving correct ideas of the great continental land-masses cannot well be over-estimated. The working method may differ according to individual preferences, but the model must *grow* under the hands of the teacher, as the child either looks on or assists in the modeling. The good effects resulting from the mere inspection of relief maps, modeled while the children are absent, will not stand comparison with the results of the work when the children watch the modeler, or, better still, assist in the modeling of the relief form.

Perhaps the most finished and elegant process of modeling the continent is to proceed from the molding of the primary highland of the mass. This is certaining a proper plan of procedure, because, in general, the central land mass gives tone and character to the entire continent. If geologists are right, however, we may not claim that it is the way in which our own continent first rose from the bosom of the great earth sea. In North America, at the close of Archæan time and in the beginning of the Cambrian age, the emerged portion of the continent consisted of one or more large islands in the northeastern part, lying mostly in the present Dominion of Canada, and having the shape of the letter V. One arm of this wedge-shaped body of land reached northeastward to Labrador, while the other extended northwestward from Lake Superior to the Arctic. To this great

northern nucleal region of the continent belong the Adirondack region of New York and the copper region of Michigan, each of which was an island in the great continental sea. In this early time, the western and southern sides of the great continental triangle lay mostly beneath the level of the sea. Still, the great plan upon which the continent was to be built was in a general way determined by chains of islands occupying the lines of the Appalachians of the east and the Rocky Mountains of the west. There were also several isolated regions in the western part of the Mississippi basin. The great continental nucleus, therefore, is marked at present by the least considerable of the elevations of the continent. This plan of the continental growth may well be employed in giving the brief statement of a great geological truth to an advanced class in geography; and thus an important chapter in the story of our continent may be studied. Geography, however, is largely a study of present land forms and surfaces. It seems logical, therefore, to begin the modeling with the Pacific highlands, the great axis of the continent.

The essential idea that the child is now to grasp is this: The **continent** is to be studied as **a solid**—as having *height* as well as length and breadth. The conception of the continent as a solid must be made clear to the pupils, for upon this fact of solidity will depend the drainage and many of the climatic conditions.

Lesson X.

Modeling North America.

Let us now proceed to the lesson upon North America. Tilt the molding-board slightly at an angle toward the pupils, and put a quantity of moist sand upon it. Draw the sand rapidly out to represent the broad Pacific highland as a mountainous plateau, with the Rocky Mountains resting on the eastern side; and the Sierra Nevada, Cascade, and lower mountains on the western edge. Spread out the sand into the broad triangular mass of the continent, and model rapidly the narrow eastern or Atlantic highland. Separate this into the Appalachian system of mountains along the eastern coast, and the highlands of Canada and Labrador north of the St. Lawrence. Describe and question as you proceed, bringing out the main points here indicated directly:

Here are the Primary Highlands occupying the entire western two-thirds of the continent, and extending in one long line of elevations from northwest to southeast, from the Arctic Ocean to the Isthmus of Panama. It is 5700 miles long, and is known as the Cordilleras of North America, or sometimes the Pacific System. It is part of the greater system extending from Cape Horn to the Arctic Ocean, and called the Cordilleras of the New World. This is the longest mountain system in the world. In North America it also becomes the broadest; it is the greatest in all respects except height.

The top of the great mass of the Pacific highlands is surmounted on either side by mountain ranges. The outer system comprises the Cascade, Sierra Nevada, and the Coast Range of mountains. The inner mountain system is formed of the Rocky Mountains and the Sierra Madre Mountains. This is the main watershed of North America, and really marks the culmination

of the continent, from which there is a general descent to the Atlantic on the east and to the Pacific on the west. The western slope keeps at nearly the same general level from the base of the Rockies to the Sierra Nevada, and then rapidly descends to the Pacific. The eastern slope is almost continuous from the base of the mountains to the Atlantic. From these two distinctly marked slopes we may see that the division of the waters by this great watershed is as natural as the division of the rain that falls upon the roof of a house by the central ridge. The waters will follow these slopes eastward and westward. What angle do you think they will make with the dividing line?

Let us now model the shorter and much narrower highlands of the eastern part of the continent. The broad valley of the St. Lawrence divides this region into two parts. One, the Alleghanies, consists of a number of low parallel mountain ranges. Here are long folds or ridges of the earth's surface, and not the wild peaks of the Rockies. As the swell gradually descends toward the interior of the continent, it becomes a series of undulations consisting of hills, then a plateau, and finally the river valley. The northern part of the eastern mountain system is known as the Laurentian Mountains. It consists of low, rounded elevations, only the highest points reaching an altitude of 4000 feet. This system is continuous with the plateau of Labrador, and with the Arctic plateau.

Here we find the Great Central Plain, resulting from the prolonged inner slopes of the two great highlands of the continent. As these two mountain lines approach each other at the south, and diverge at the north, they give to North America its characteristic triangular form. A great depression separates them at the south, and thus we find here the great Mediterranean, the Gulf of Mexico. Far to the north the central depression falls again below the level of the sea, and gives to the continent its great northern Mediterranean, Hudson's Bay.

Nearly all of the lowland of the continent is found in this great plain formed by the long eastern slope of the primary highland and the long western slope of the secondary highland. This is one of the largest valleys in the world. Near the great lakes a swell, called the Height of Land, extends across the central plain, dividing it into a northern and a southern slope. The Height of Land rises imperceptibly from the plain and impels the waters northward and southward. The northern slope becomes the Arctic plain; the southern slope is the Mississippi Valley.

Where do you think the main rivers of this continent may be found? Open your geographies to the map of North America. Where is the principal river of the continent? In what direction does it flow? Which main river flows eastward? Name its slopes. Mark it upon the model by this bit of string. Locate the largest river by strewing some of this salt to mark the river's course. What right has this river to give name to the system? Why does it flow in that direction? Why do not its tributaries flow into it at right angles to the course? Name the principal tributaries of this river. Find the three great water-partings or watersheds of the continent. Trace the continental axis as shown upon this map.

Lesson XX.

Elevations and River Basins.

Other river systems and the remarkable lake regions should be studied. Cross-sections of the continent as molded should be drawn at various latitudes. Cut through the sand along the given line, exposing enough of the elevation to allow the pupils to draw correctly (Fig. 35). Call for other drawings without the making of the actual cut on the model. Let one of the cross-

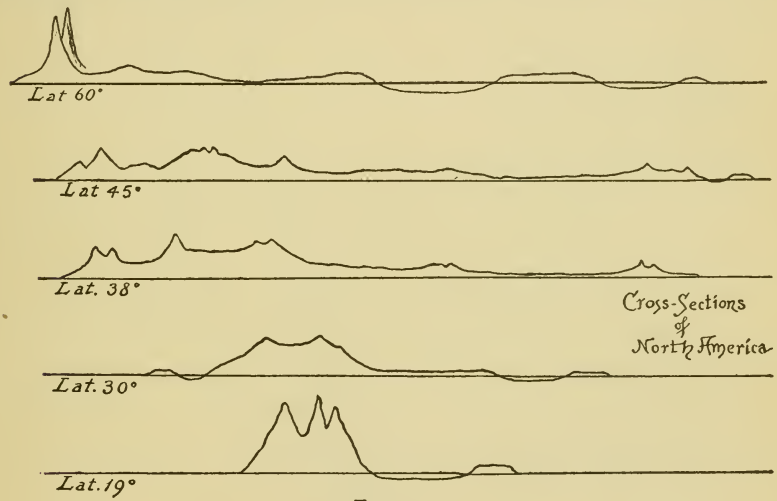


Fig. 35.

sections made be in latitude 38°, from San Francisco to Washington, D. C.; another in latitude 45°, from Portland, Oregon, to Halifax; another at latitude 30°, Rosario [Lower California], New Orleans, and St. Augustine; another across Mexico and Yucatan at 19,° the approximate latitude of Vera Cruz. Make sections also from north to south.

Study the slopes, and speak of the two inner slopes forming the great basin of the Mississippi.

How many water-partings has a river basin?

Opposed to the line of meeting of the slopes at their upper edges—*the water-parting*—find the *river-bed* forming the line of meeting of the slopes at their lower edges.

Study the relative amounts of water contributed by the two slopes of this great basin.

Where are the great water centers of the continent? [A, B, C.] (Fig. 36).

The slopes in this continent of North America are such as develop the germs of civilized life. In other lessons we may study:

1. The fertile soil.
2. Abundant waters.
3. Excellent harbors.
4. Luxuriant vegetation.
5. Position across the currents of air and ocean.
6. Across the trend of migration.
7. The centers of industry.
8. The mines of gold, silver, platinum, mercury, and lead. (Western highlands.)
9. The mines of coal, iron, and nickel. (Eastern highlands.)
10. The mines of copper. (Lake Superior.)
11. Where salt is found. Petroleum.
12. The river systems and water centers.

MODELING FROM THE FLAT LAYER OF SAND.

Some teachers prefer to commence the work of map-molding by spreading a thin layer of sand over the board, and then outlining the continent in the sand by means of a pointed stick or pencil. The excess of sand beyond the shore lines is then brushed carefully away, and the mountains and river basins lo-

FIG. 36.

cated and modeled. A small sieve may be used in spreading the even layer of sand, while common paint-brushes may be used in taking away the sand around the outline. Give the ingenious

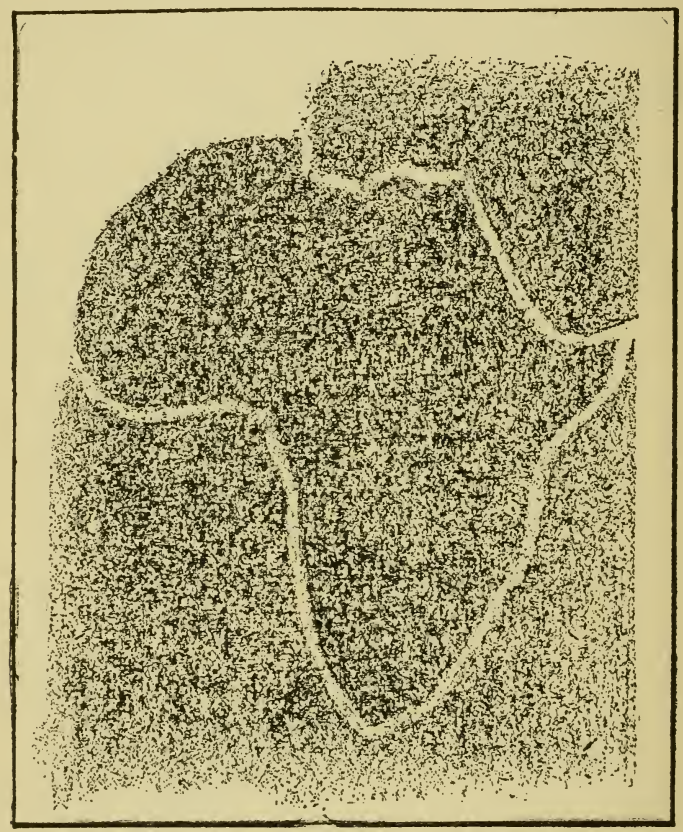


FIG. 37.

boy a hammer and a small nail, and he will soon make an excellent sieve from a common tin basin. In all of this work in the schoolroom there must be adaptation to conditions; and the re-

sults reached will be gauged by the teacher's power to utilize the material that lies nearest.

Dry white sand is the best for use in this method of modeling.

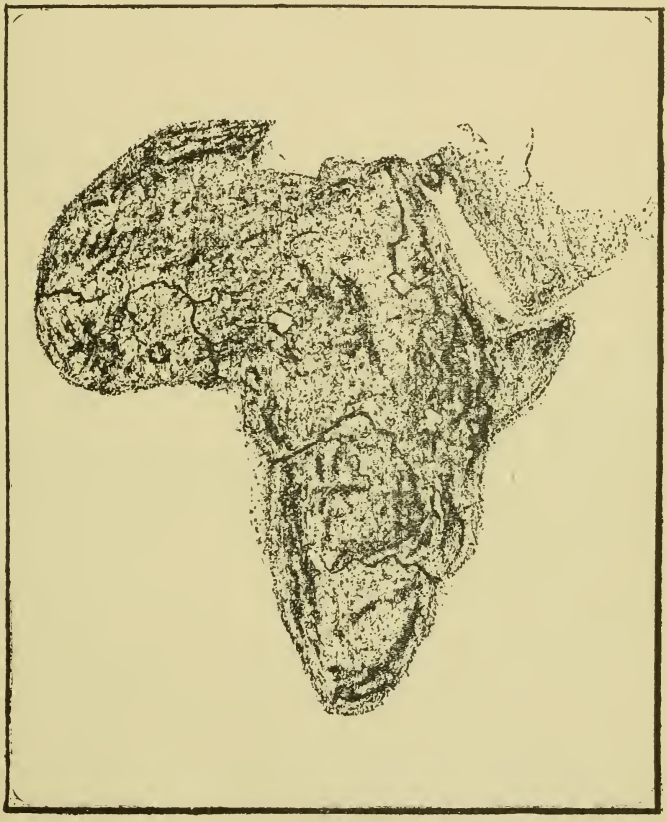


FIG. 38.

Salt, meal, and some other substances have been successfully employed for the same purpose. The plateaus and mountain ridges are modeled by increasing the thickness of the layer at the vari-

ous points necessary (Fig. 38). The sand will not be raised so high, but in some respects this is an advantage. In modeling a continent the teacher should make use of profiles carefully

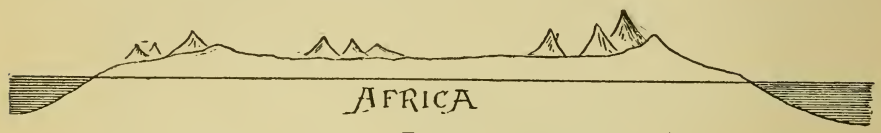


FIG. 39.

drawn (Fig. 39). The pupils should make drawings of sections of the continents, taking first a cross-section from east to west, and then from north to south.

MOLDING UPON AN OUTLINE.

A method in much favor in the molding of the continents is that in which the outline of the continent is first sketched or stenciled upon the molding-board, or upon a large sheet of paper placed upon the board. The relief-map (Fig. 40) is then molded in sand spread outward to the outlines as thus marked. The sheets of manila paper upon which the outlines have been drawn may be preserved for use from day to day, and the maps reproduced as occasion may demand. Such a series of stencil outlines may be made from the basal lines given in this book for each of the continents. If the maps be constructed to a uniform scale, many valuable comparisons may be made.

MOLDING FROM A CENTRAL MASS.

But the most valuable method of sand modeling is that in which the freedom and power of the pupil are combined in the search after the **mass-form** of the continental relief. In such modeling the work proceeds from a central mass of the material, gathered near the center of the board. A few approximate di-

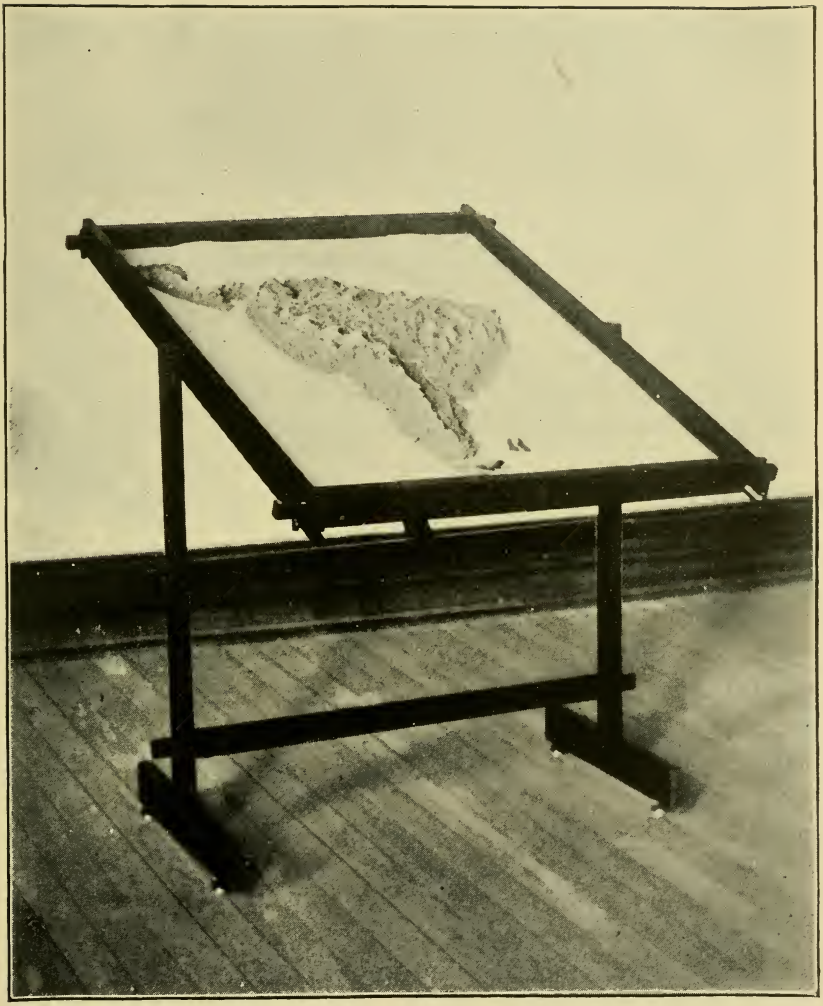


FIG. 40.

mensions are taken in the division of the sides of the board into halves, thirds, quarters, etc., and then the work of modeling proceeds in the drawing out of the sand in lines, broad or narrow, according to the relief and contour of the continent.

The outline of the shores of the continent is then formed by pushing the sand back along the lines at the proper places, according to any good outline map of the continent. The highlands and mountain ranges are then modeled, and the map finished according to the details previously given.

The plans here given for the molding of the various continents are the results of the best class-room work in molding these forms. Other plans will suggest themselves to both pupils and teachers, but these may serve as examples of plans that have been successfully employed.

Care should be taken that the directions for individual modeling be given slowly, so that each pupil may follow the movements as planned, and thus the results may be uniform and satisfactory.

A Lesson with the Molding Board.

This lesson is designed to show one way in which the molding-board may be used in the advanced class in geography. A lesson on South America has been assigned and studied. (Harper's Geography.)

The teacher is provided with a molding-board constructed according to the directions previously given, and shown in accompanying figures.

The board itself is two feet eight inches wide and three feet four inches long, and is mounted upon a stand so as to be about three feet two inches from the floor. The board may be placed horizontally, or inclined, as shown.

Each member of the class is provided with a small lap-board,

sixteen inches by twenty inches, having strips of inch-molding tacked around the edges. Two handfuls of molder's clay complete the outfit. A somewhat larger amount of sand is placed in the large molding-board.

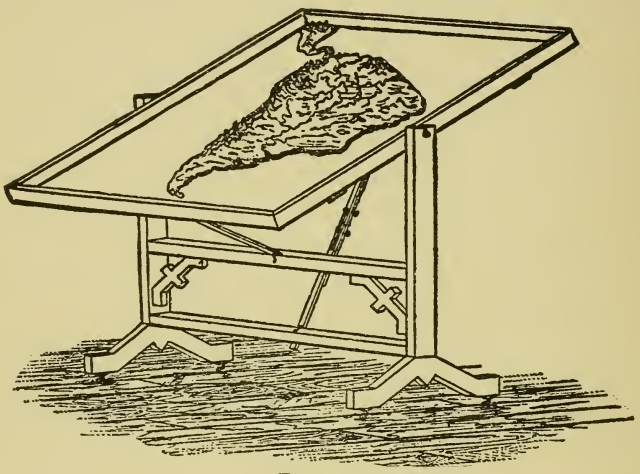


FIG. 41.

Teacher.—Class will give strict attention to the directions, and carry them out carefully.

a. Gather the sand in a conical pile near the center of the board (Fig. 43).

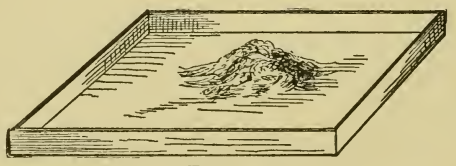


FIG. 42.

b. Divide the right-hand side of the board into thirds, and mark the upper third with a pinch of sand.

c. Bisect the lower side, *CD*, and mark the central point.

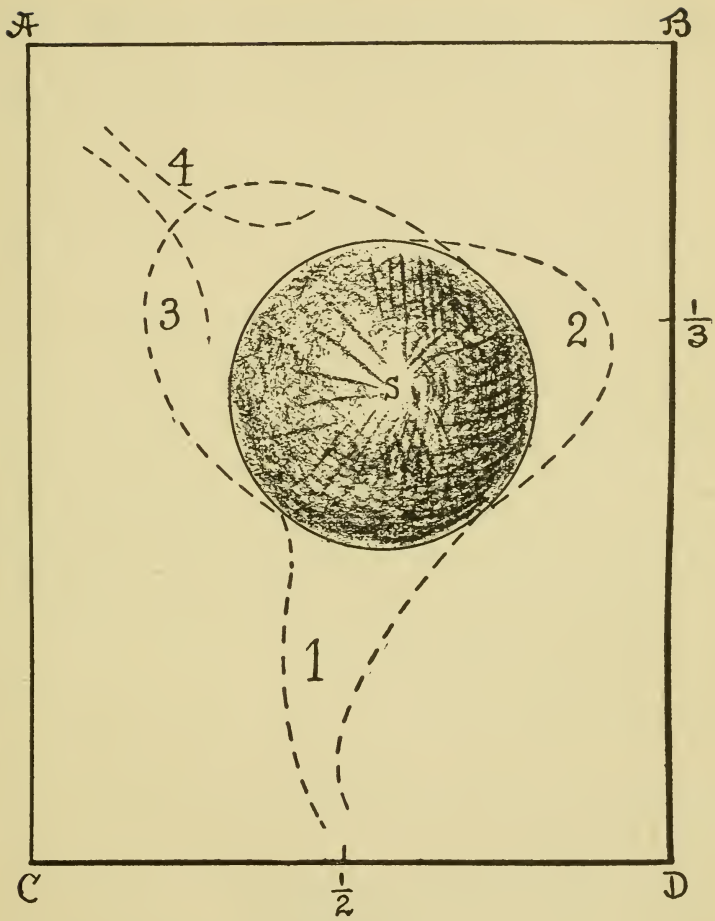


FIG. 43.

1. Place the hands upon the top of the pile, and draw the sand in a narrowing and somewhat curved band toward the point at the bottom of the board.

2. Return to the center, and draw the sand in a broad mass nearly out to the point on the right.

3. Place the hands again at the center, and draw the sand in a broad oval mass toward the upper left corner at *A*, half the distance from *S* to *A*.

4. Draw out a narrow line toward the point *A*.

5. Complete the outline of South America by pushing the sand back at the proper points along the coast line. Follow the large outline map.

It will be noticed that move (1) molds roughly the narrow main axis of the continent; the next, (2), gives the broad expansion of Brazil and its secondary highlands; while (3) and (4) extend the main axis northward, and give the highlands of Guiana.

The main highland system in the west, the extended low tablelands of Brazil in the east, the smaller mountainous region of Guiana on the north, and the great central plain along the foot of the Andes and between the eastern highlands, together with its three great river systems, form the fundamental features of the continental structure. This structure is characteristic, and is not repeated in any other continent.

The class has now an outline map of South America, made in much less time than is taken in reading these directions.

Teacher.—What mountain range extends along the western coast of the grand division?

Ans.—The Andes.

The Andes mountains are molded in place.

Teacher.—What are the secondary systems?

Ans.—The mountains of Brazil and of Guiana, both in the eastern part.

The secondary mountains are molded.

Teacher.—What have we now between the mountain systems?

Ans.—Three great plains, or three sections of one grand plain.

Teacher.—What great rivers drain this grand plain?

Ans.—The Amazon, the Orinoco, and the La Plata.

Teacher.—The central section of this grand plain is drained by what river?

Ans.—The Amazon.

Teacher.—This great "Swamp River" runs through the largest forest in the world. What name is given to this region?

Ans.—The Selvas of the Amazon.

Teacher.—What is the meaning of the term *selvas?*

Ans.—Woods.

Teacher.—Can any one tell me why this region is almost unoccupied by civilized man?

Ans.—The climate is unhealthful, being hot and moist.

Teacher.—Yes, malarial fevers prevail in such climates.

Class here roughly outlines the Amazon by means of pieces of blue twine laid on the surface of the central plain.

Teacher.—What river drains the northern part of the grand plain?

Ans.—The Orinoco.

Teacher.—What name is given to this region?

Ans.—It is called the "Llanos," meaning plains.

Teacher.—This section is called by the natives the "Sea of Grass." It is one vast meadow during the rainy season; but at the end of the dry season it is a scorched desert, swept by hot winds. What use do the inhabitants make of these plains?

Ans.—Large numbers of horses and cattle are raised.

Teacher.—What other section of South America is suitable for the support of cattle?

Ans.—The third or southern portion of the grand plain. This is drained by the La Plata, and is called "*the Pampas.*"

Teacher.—These animals constitute the chief wealth of the inhabitants of the llanos and the pampas, and determine the occupations and exports. What are some of these exports?

Ans.—Hides, wool, beef, and tallow.

Teacher.—Where is the great desert region of the grand division?

Ans.—The northern part of the western coast is a dry desert.

Teacher.—Why is this section desert?

Ans.—The trade-winds from the east lose their moisture in crossing the Andes, and, passing down to the Pacific, cause the great rainless coast, eighteen hundred miles long.

Teacher.—What can you say of the southern portion of the western coast?

Ans.—The counter trade-winds of the South Pacific cause this portion to be shrouded in clouds and drenched with rains.

(Bell rings.)

Teacher.—Class may study for to-morrow the vegetation and animals of South America. Also consider the political geography in its principal points. The boards may be placed near the door as you pass out.

A Progressive Sand-Map: South America.

The teacher has by his side the map of South America molded during the lesson of the day preceding, and the sand-map is tilted so that the entire class may see it plainly. The small molding-boards are not used during this lesson. A number of specimens of various plants, a picture of an animal, and a few pieces of stone or other mineral matter may be used as aids in development. Attention is called to the roots, stems, and leaves of the plants, and to the head and limbs of the animal, while a short time is devoted to the development of their nature and uses. It will be found in many cases that even some of the older pupils will need the development of the term *organ.*

Teacher.—In what respects do plants and animals resemble each other?

Ans.—Both have life, dependent upon organs or parts fitted for special uses.

Teacher.—I break this stone into two parts; why are not these pieces organs?

Ans.—Because each piece is like the other in its qualities, and the whole stone has no life.

Teacher.—What are some of the organs of plants?

Ans.—Roots, stems, and leaves.

Teacher.—How are plants nourished?

Ans.—Plants are nourished by inorganic substances taken from the soil and from the air.

Teacher.—Upon what does vegetable life depend?

Ans.—Heat and moisture are essential, and should be aided by light.

Teacher.—Turning now to the examination of South America, in which part should we find the greatest richness and variety in vegetation?

Ans.—In those parts having the greatest heat with the greatest moisture. The lowlands of the northern part are within the torrid zone, and are hot.

Teacher.—How is the other condition fulfilled?

Ans.—The easterly trade-winds and the water-courses supply abundant moisture.

Teacher.—What is the nature of the resulting climate?

Ans.—The climate is damp and unhealthy.

Teacher.—The sickly climate is the cause of the undeveloped condition of the region of the great *Swamp River*, which drains an area more than double that of any other river system of the globe. What is the general character of the animal life of this region?

Ans.—On account of the great amount of moisture and the luxuriant vegetation, those animals are most abundant that by their mode of life are connected most closely with the vegetable kingdom and the water.

Teacher.—Mention some of them.

Ans.—Insects are very numerous, and are noted for size of body and brilliancy of coloring. There are many reptiles, such as the alligator, lizard, and boa-constrictor.

Teacher.—Name some of the land animals.

Ans.—The puma, jaguar, monkey, armadillo, and tapir.

Teacher.—What people dwell on the Amazon?

Ans.—Many tribes of Indians; some half-civilized, others savages.

Teacher.—What are some of the forest products of the section?

Ans.—Rosewood, mahogany, tortoise-shell wood, various dye-woods, Brazil-nuts, cocoanuts, and caoutchouc or India-rubber.

Teacher.—Pronounce that word again, Charles.

Charles.—Caoutchouc (koó-chōōk).

Teacher.—Use the dictionary in all such cases. What country of South America includes the Amazonian region?

Ans.—Brazil.

Teacher.—How large is Brazil?

Ans.—It comprises more than two-fifths of the continent, or more than three and one-fourth million square miles.

Teacher.—Where do we find most of the cities of the republic?

Ans.—All of the large cities are seaports on the Atlantic.

Teacher.—In what other parts of South America are important cities found?

Ans.—In the tablelands of the Andes, and along the northern coast.

Teacher.—Notice that nearly all of the civilized people in South America may be found in a broad band which surrounds the continent and crosses the southern portion a little south of the mouth of the La Plata. Commencing at the Isthmus of Panama, let us name and locate on the sand-map the cities in this band or chain, using these little colored squares and triangles to mark the proper locations. Anna may name and locate the first city.

Anna.—Aspinwall, on the northern shore of the Isthmus. (Places a triangle in position), (1).

Teacher.—What can you say of this city?

Ans.—It is the northern terminus of the Panama Railroad, which connects the Atlantic with the Pacific.

Thus the following are located and described: Cartagena, Maracaybo, Caracas (capitals located by squares), (2), La Guayra, Georgetown, Paramaribo, Cayenne, Para, Pernambuco, Bahia, Rio Janeiro, Ascencion, Montevideo, Buenos Ayres, Cordova, Santiago, Valparaiso, Sucre, La Paz, Potosi, Arequipa, Lima, Callao, Quito, Guayaquil, Bogota, and Panama.

Teacher.—I hold in my hand some little strips of wood covered with gilt paper. Clara may take them and locate the places in which gold is found.

Clara places one in Colombia, and others in Peru, Chili, Brazil, and French Guiana (3). Thus, also, the great silver, copper, tin, iron, salt, coal, and diamond districts are located. If time permits, the same plan may be used in locating the districts in which wheat, sugar, wool, etc., are produced.

Teacher.—Where are the great coffee regions of South America?

Ans.—Brazil produces more than half of the coffee consumed in the world. Colombia, Venezuela, and Guiana produce large quantities of coffee.

Teacher.—In what parts is cotton raised?

Ans.—Cotton is raised in Guiana and Brazil.

Teacher.—For the next lesson the class may determine the wheat, cocoa, sugar, wool, and cattle regions of South America; also, the characteristic plants and animals of the plateaus. This outline, which James has prepared, may be used in the study of Brazil.

BRAZIL.

1. Location.
2. Boundaries.
3. Extent.
4. Population.
5. Products.
   (*a*) Animal.
   (*b*) Vegetable.
   (*c*) Mineral.
6. Occupations of Inhabitants.
7. Characteristic Animals.
8. Cities.
   (*a*) Capitals.
   (*b*) Seaports.
9. Commerce.
10. Government.
11. History.

Outlines of this kind should be assigned to pupils as part of their regular work.

The lesson as here given was used for advanced pupils, but the same general plan may be followed in all grades. The blocks used in the kindergarten may take the place of the colored squares and triangles, and other supplies be used for the location of the metals, etc. However, all the material necessary may readily be prepared by any of the brighter pupils. As the map grows from day to day, the interest increases, and strong impressions are made. In one recitation, a little girl brought for the purpose of locating the coffee regions a number of strips of cardboard to which roasted coffee beans were attached. Her idea might be extended, and the cotton regions, wheat regions, etc., be similarly located.

North America.

The board upon which these maps are molded is 32 inches wide and 40 inches long, or in the proportion of four in width to five in length. The sand is gathered in a conical heap near the center of the board. Lessons similar to those given on South America should accompany the modeling.

DIRECTIONS FOR MODELING.

a. Divide the right side of the board into thirds and mark the upper one (Fig. 44).

b. Divide the lower side into halves and mark the center.

c. Gather the sand in a conical pile a little above the center of the board.

1. Draw the material in a broad band toward the corner *A*, narrowing the line of sand as it approaches the corner, and giving it a slight bend to the south.

2. Draw the sand from the center, in a gradually diminishing band, toward the middle point at the bottom, and then draw it in a curve toward the corner *D*.

3. Return to the center, and draw some of the sand nearly out to the upper third marked on the right-hand side of the board.

4. Draw some of the sand in a broad oval toward the lower corner at *C*.

5. Do the same in a smaller oval toward the lower right-hand corner at *D*.

6, 7, 8, 9. Model the peninsulas of Florida, California, and Yucatan, and remove the circular mass, **6**, to form Hudson Bay.

10. Model the coast-line according to any good outline map.

11. Model the primary and secondary mountain ranges, and locate the rivers, etc.

In this plan for molding North America, the first movement and the second, **1** and **2**, give the main axis of the continent. The triangular form is then obtained by **3**; while **4** broadens the western plateau, and **5** gives the secondary highlands of the east. Hudson Bay and Labrador are modeled in **6**, while the other peninsulas are given by **7**, **8**, and **9**.

The characteristic features of this continent are the great

highland system on the west, forming half of the entire continent; the narrow highland region of the east; the great central

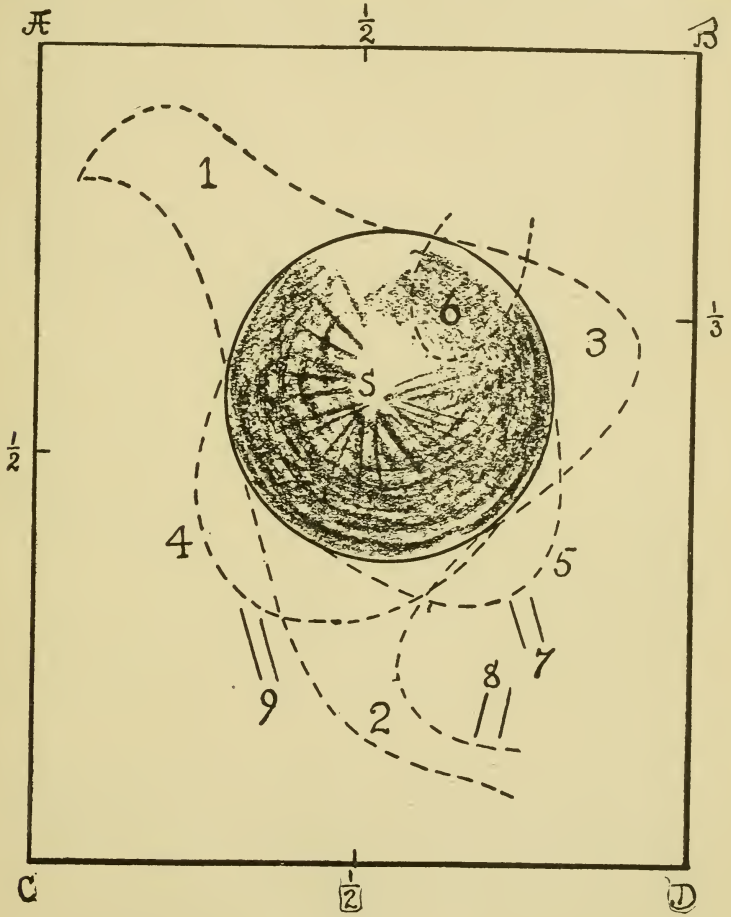


Fig. 44.

plain resulting from the union of the inner slopes of these two systems; the remarkable chain of lakes; the two inland seas;

and the union of the waters into a few great systems. The predominant character of the vast main highland of the continent is that of immense plateaus, while the eastern highland consists of parallel ridges or folds. The western highland is of vast extent, and of great height; it is unbroken from the Arctic to the isthmus of Tehuantepec. The low eastern highland is broken entirely across by two valleys, through either of which the heart of the continent is reached.

The Rocky Mountain system forms the great watershed of the continent, and is its controlling feature. All that is characteristic of the continent is allied to this great land mass in greater or less degree.

Africa.

DIRECTIONS FOR MODELING.

a. Bisect the upper, lower, and left-hand sides of the board, and place the proper marks.

b. Mark the upper third of the right-hand side.

c. Gather the sand a little above the center of the board.

1. Draw the sand in a broad, increasing mass toward the corner *A*, and carry it nearly to the centers of the upper and left sides (Fig. 45).

2. Pull the sand in a broad and slightly-decreasing mass from the center nearly to the middle point at the bottom of the board.

3. Draw the line of sand, with an upward sweep and a narrowing mass, nearly out to the upper third on the right.

4. Draw the sand in an oval mass slightly toward the upper right corner at *B*.

5. Model the shore by any good outline map.

6. Locate the main axis and the other mountain ranges, the rivers, the deserts, and other natural features of the continent.

Africa somewhat resembles South America in form, but its

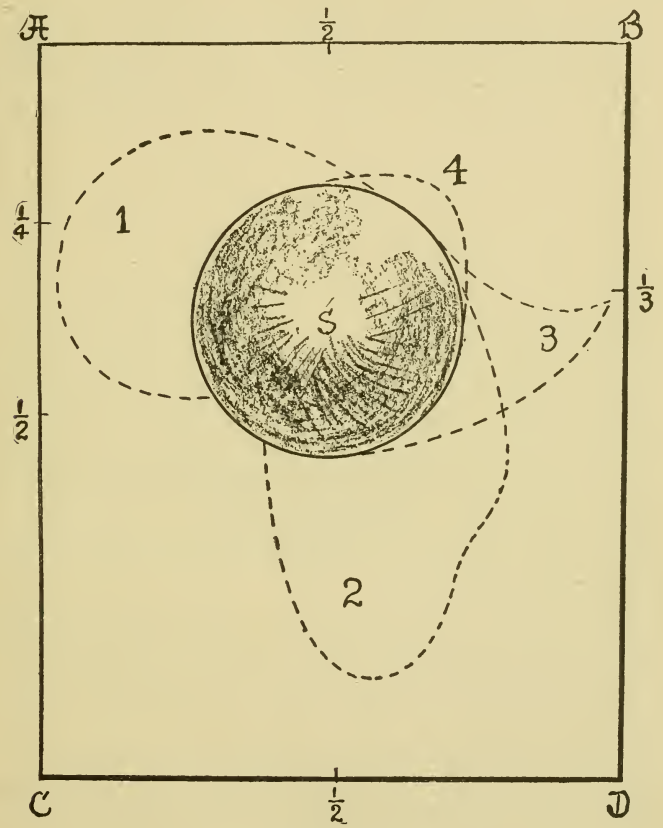


Fig. 45.

plan of structure combines that of the Old World and of the New. It may be considered in two parts, the southern having, like the American continents, its greatest extent from north to south;

while the northern part extends from east to west. The whole continent forms one vast plateau, which is surmounted by short, irregular mountain ranges.

The first movement, **1**, extends the northern part as a broad plateau, and introduces the new east and west axis; while in **2** the north and south line of the main axis appears. The other movements, **3** and **4**, are simple extensions modifying the main form.

Australia.

DIRECTIONS FOR MODELING.

a. Divide the upper side of the board into thirds and mark the right-hand division.

b. Bisect the left side, and then bisect the lower half of the side, placing the proper marks.

c. Gather the material at the center.

1. Draw the sand in a broad oval toward the lower right-hand corner at *D* (Fig. 46).

2. Draw the material in a broad, angular band nearly out to the two points on the left.

3. Scoop out a small quantity of the sand at the top, and draw it in a tapering band toward the point on the upper side.

4. Model the shore-line and axes of the continent, and locate the main river basin.

Australia resembles Africa more closely than any other continent. The primary mountain system is in the east, and is for the most part composed of broad plateaus. The secondary systems are in the west and north. Africa terminates in a plateau, while Australia is terminated by a great low plain which descends by long slopes from the interior of the continent.

In modeling this continent, the first movement, **1**, gives the predominant system, the second, **2**, gives the western

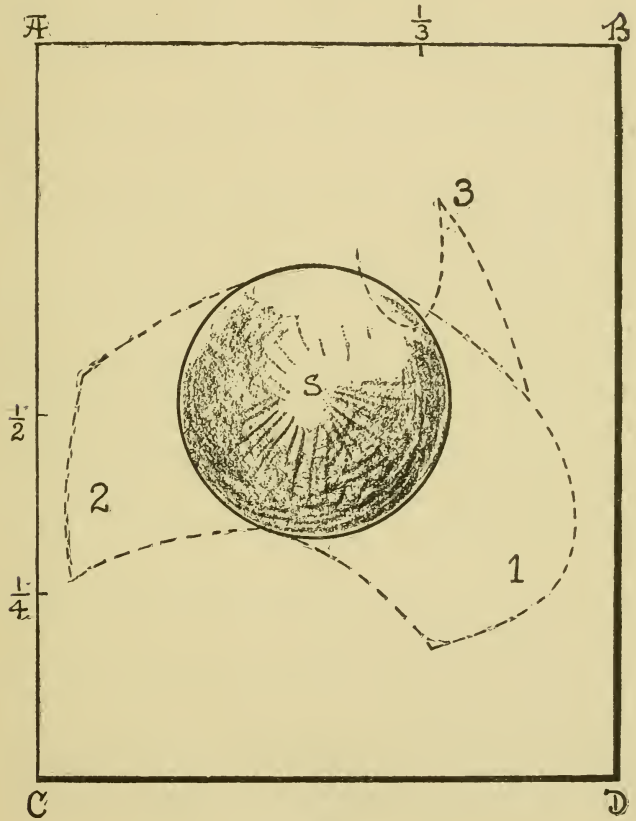


Fig. 46.

plateau, while the third, **3**, completes the main axis by adding York peninsula.

Asia.

DIRECTIONS FOR MODELING.

a. Divide the upper, lower, and left sides into two parts, and place the usual markers.

b. Bisect the lower half of the left side.

c. Trisect the right-hand side, and place pinches of sand at the points.

1. Draw the sand in a broad, angular band toward the corner *B* and the central point at the top, narrowing as the sand is drawn out nearly to *B* (Fig. 47).

2. Draw the material in a wide, flat band toward the two points on the left.

3. Draw the sand in a broad mass toward the lower third of the right-hand side and the lower corner at *D*, drawing it out in a narrow line toward the corner *D*.

4. Draw the material in a short, pointed mass toward the central point of the lower side.

5. Pull the sand in an oval toward the upper third on the right.

6, 7. Model narrow bands of the material to show the peninsulas of Kamtchatka and Corea.

8. Model the indentation for the Persian Gulf, and complete the outline of the continent.

9. Mold the mountains of the great central mass, and locate the secondary ranges. Indicate the rivers, lakes, basins, deserts, peaks, and other features of the great continent.

Asia is characterized by the immense mass of elevated land forming the interior of the continent; by a series of great projections along the eastern and southern coasts; and by its band of islands and narrow peninsulas parallel to the coasts of the eastern

projections, and inclosing remarkable border seas. It forms with Europe one double continent, with one general plan of structure, but with differences in the details of the two continents.

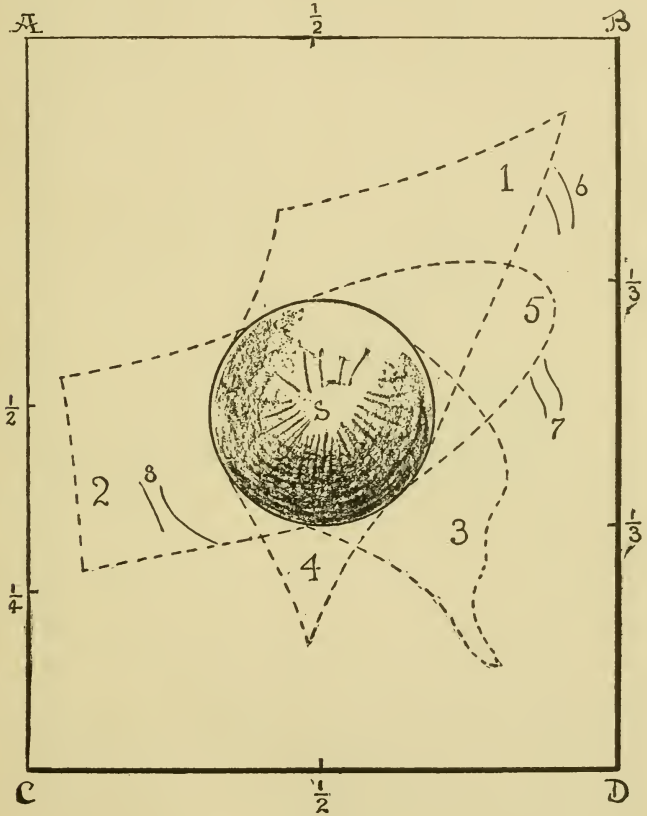


Fig. 47.

The pile of sand at *S* will represent the great central mass of elevated land; so the first move, 1, is to draw the sand northward in a broad band to represent the almost uninterrupted slope

which descends to the Arctic ocean on the north. The second move, **2**, will mark the westward extension of the main axis of the continent by the Hindoo Koosh mountains, while the width of this band will represent the slope toward the Caspian and Aral seas on the west. At **3** we extend the main axis in the mountains of southern China. Move **4** marks the peninsula of Hindostan, one of the remarkable series of projections that characterize the continent. One of the secondary axes is molded in the movement of the sand at **5**. The peninsulas of Kamtchatka, Corea, and Arabia are molded by **6**, **7**, and **8**.

The Ural and Soliman mountains mark the line of separation between the two parts of the one great continental mass of Eurasia.

Europe.

DIRECTIONS FOR MODELING.

a. Bisect the right and left sides, and mark as usual.

b. Bisect the upper half of the right side, and the lower half of the left side.

c. Gather the sand in a conical pile to the right of the center of the board.

1. Draw the sand toward the corner *B*, and outward to the lower point on the right ; and let the upper part of the mass extend to the upper right-hand mark (Fig. 48).

2. Draw the material in a band toward the quarter-point on the left, and then make a sharp bend toward the corner *C*.

3. Draw a portion of the sand toward the corner *D*, and make it extend only a very short distance.

4. Draw a pointed mass toward the center of the lower side.

5. Mold a part of the sand by drawing it first toward the corner *A*, and then with a sharp curve drawing it toward the corner *C*.

6, 7, 8. Model the peninsulas of Italy and Jutland, and the indented Bay of Biscay. Complete the outline.

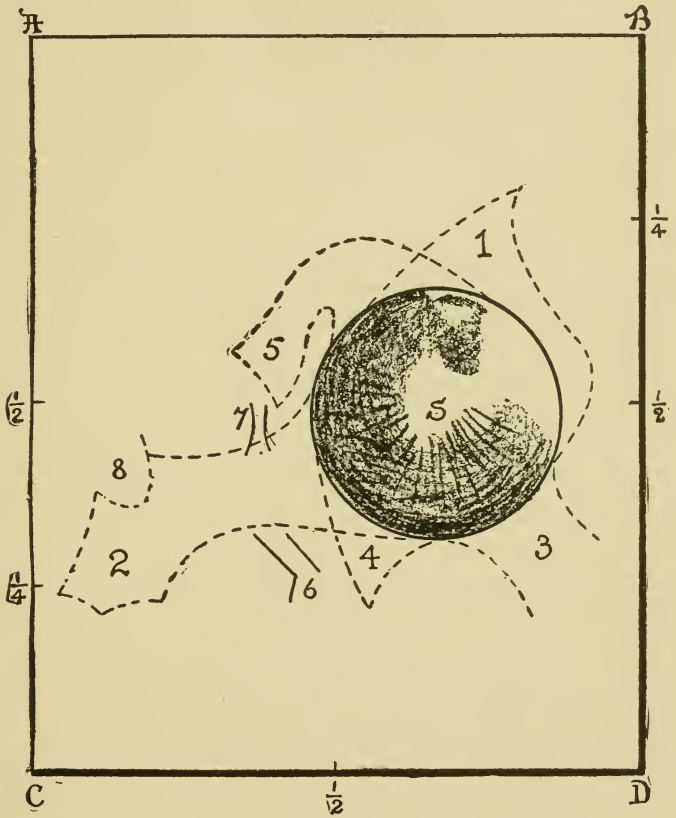


Fig. 48.

9. Model the central mass of the Alps, and the mountains of Spain and Scandinavia. Locate the river basins.

Europe resembles Asia in the number and position of its southern peninsulas. It may be divided into two parts, High

Europe and Low Europe. The highlands are in the interior, with a belt of plains west, north, and east of them, while their peninsulas prolong them to the south.

The first move, 1, spreads out the sand toward the north in the great low plain without a single mountain range. The low swell of the Valdai Hills forms the principal watershed of the continent. Move 2 draws the heap of sand westward to represent the main axis of the continent, and the great Iberian peninsula.

The third move, 3, extends this main axis of the continent in a curve which reaches from the Straits of Gibraltar to the shores of Asia Minor. The central Alps form the highest point of the continent.

The fourth move, 4, molds the basis of the Turco-Grecian peninsula; while 6 outlines the Italian peninsula.

The secondary systems of the continent are modeled by movements 5 and 1, while the seventh movement 7, gives the peninsula of Jutland.

HOW TO MOLD EUROPE IN SAND.

These plans for modeling this continent were prepared by the pupils. In the plans the long sides of the lap-boards are assumed to extend from right to left. At any one recitation the entire class modeled according to a plan dictated by one of the pupils.

No. 1.

Divide the western side into three equal parts, marking the points of division 1 and 2.

Divide the eastern side into three equal parts, 3 and 4.

Divide the northern side into sixths, marking the points, beginning at the left, 5, 6, 7, 8, 9.

Divide the southern side into halves, and the eastern half into thirds; mark the points 10, 11, 12, beginning at the left.

Place the soil in the center, the long sides of the board being horizontal.

Draw the soil in a somewhat narrow line toward the point 2 on the west.

Draw the soil in a broad band northeast toward points 3 and 9; also southeast toward point 4.

Draw the soil toward 7 and 8, and then push it southward in a curve, not extending farther west than point 6.

Draw some of the soil in narrow bands toward points 11 and 12 on the south, forming the Italian and Turco-Grecian peninsulas.

Finish by outline map, marking the mountains and river systems.

LOTTIE KIMPLE.

No. 2.

Divide the northern side of the board into halves, the eastern side into thirds, the western side into fourths, and the southern side into halves, and bisect the eastern half.

Placing the hands upon the central pile, push some of the sand toward the northeast corner of the board. Returning the hands to the center of the sand, draw out a narrow band to the lowest mark on the west. Push the sand in a mass toward the center of the northern side, and from that point draw some sand in a narrow strip toward the southwest, to form the Scandinavian peninsula. Now draw the sand toward the most southern marker on the east. Draw out two narrow bands toward the marks on the south. Shape the coast-lines carefully according to outline map.

S. M. ELY.

No. 3.

Turn the board so that the longest sides shall be horizontal.

Divide the northern side into halves, and bisect the eastern half.

Divide the eastern side into two equal parts, and then bisect the southern half.

Divide the southern side of the board into fifths.

Divide the western side into two equal parts, and then bisect the southern half.

Place the hands upon the clay at the center, and draw it to the most easterly marker on the northern side. Draw the clay in a broad band toward the two points on the east.

Draw out the clay in a narrowing line toward the lower point on the western side.

Draw out the clay in two short lines toward the extremities of the central fifth on the southern side.

Mold in the shore-line carefully according to a good outline map. Represent the mountains-chains, and principal rivers.

DOROTHEA M. LOUCKS.

No. 4.

Draw the molding-clay into a heap a little to the west of the center.

Divide the northern and the eastern borders into fourths.

Divide the southern border into halves.

Divide the west side into thirds, and then trisect the lower third.

1. Place the hands upon the mold at the center and draw the clay southward, ending in a narrow band at the bisecting point on the southern border.

2. Next draw the mold toward the southwestern corner, the

southern limit of Spain being in a straight line with the most southern point of division on the western border.

3. Then push the mold toward the most eastern fourth on the northern border, terminating just east of that point.

4. Push the clay north and west about one-third the distance from the center to the western border.

5. Draw the molding-clay in a band toward the southern fourth of the eastern side.

6. Complete the coast, making the eastern end of the Caucasus mountains, the southern point of the Crimea, and the shore of the Gulf of Genoa all in line with the southern fourth on the eastern border.

Make the northern extremity of the Baltic Sea in line with the most northern fourth on the eastern border.

A. E. WHITE.

Geographical Contrasts and Resemblances.

In connection with the work in modeling the continents the students should be called upon to make comparisons for finding the likenesses and differences between the various continents. The following samples of such work are taken from the class-room, except the last, which is from *Tate's Philosophy of Education.*

COMPARISON OF NORTH AMERICA AND SOUTH AMERICA.

RESEMBLANCES.

1. Both are triangular in shape.
2. " " wide at the north.
3. " " narrow at the south.
4. " have the primary highland in the west and near the largest ocean.
5. " " a secondary highland in the east.
6. " " a central plain divided into two parts by a transverse water-parting.
7. " " their rivers collected into large systems.
8. They are alike in the position of their large rivers, as in the case of the

   Mississippi and La Plata,
   St. Lawrence " Amazon,
   MacKenzie " Orinoco,
   Yukon " Magdalena.

9. They are alike in the position of their highest mountains.

   Mt. Logan in British America,
   Mt. Illampu in Bolivia.

10. Both have a set of islands off the southeastern coast.

DIFFERENCES.

1. The coast of North America is deeply indented, while that of South America is not.

2. The transverse mountain range in North America is low, while in South America it is much higher.

3. The ranges of the secondary highland in North America are close together; those of South America are spread apart.

4. The largest river of North America flows south; that of South America flows east.

5. The central plain of North America is thickly inhabited, while that of South America is almost uninhabited.

6. North America was settled by people from northern and central Europe, while South America was settled by people from southern Europe.

7. The cities of North America are found all over the country; those of South America are near the coast.

8. North America is principally in the North Temperate Zone, while South America lies mostly in the Torrid Zone.

LOUISE M. WELLER.

Nov. 8, 1894.

COMPARISON OF EUROPE AND ASIA.

RESEMBLANCES.

The predominant systems of Europe and Asia are both in the south.

The culminating points of both are in the south, in the predominant mountain systems, and near the deepest oceans.

Both have their greatest length from east to west.

Both extend toward the south in three great peninsulas.

Both lie largely in the North Temperate Zone.

Both have great low plains in the north.

Asia is drained by a great number of river systems having few tributaries. The plateau of Thibet forms the drainage center from which the rivers flow north, south, east, and west.

Europe is drained by a great number of small rivers. Some rise in the predominant mountain system, yet the majority in the low elevations of the Valdai Hills.

DIFFERENCES.

In Europe the secondary systems are in the north and east. In Asia they surround the predominant system.

In Europe the great low plain lies between the predominant and secondary systems.

In Asia it is on the north and west, and lies between the mountain systems of Asia and the secondary system of the Urals.

Asia is about five times as large as Europe.

Asia has nearly twice as much coast-line as Europe, but in proportion to area Europe has three times as much coast-line as Asia.

Europe has one hundred and ninety square miles of surface for one mile of sea-coast. Asia has five hundred square miles of surface for every mile of sea-coast.

Europe is more indented than Asia.

The area of the peninsulas compared with that of its entire area is one to four in Europe. In Asia it is one to five and a half.

IDA HAMILTON.

NOV. 10, 1894.

COMPARISON OF NORTHERN AND SOUTHERN CONTINENTS.

Taken in successive pairs:—the Americas ; Europe and Africa; Asia and Australia.

RESEMBLANCES.

Both continents are characterized by river systems.

The Atlantic Ocean receives the water of most of the river systems of both continents.

The largest rivers of both continents take their rise in the primary mountain systems of each.

The primary mountain system in both northern and southern continents is near the Pacific Ocean.

Both continents have primary and secondary highlands.

Both continents contain extensive lake systems.

Both continents contain extensive plains.

The culminating points of both continents are near the coast.

DIFFERENCES.

The coast-line of the northern continent is deeply indented, while that of the southern continent is very regular.

The length of coast-line in the northern continent is much greater in proportion to the area than the length of coast-line in the southern continent.

The northern continents combined are much larger than the southern continents.

The northern continent is characterized by inland and border seas; the southern by gulfs and bays.

The northern continent lies mainly in the North Temperate Zone ; the southern continent lies almost entirely in the Torrid Zone.

The northern continent is densely inhabited, while the southern continent is comparatively thinly settled.

The inhabitants of the northern continent are highly civilized, while those of the southern have made little progress in the way of civilization.

The cities of the northern continent are scattered in all parts of the continent, while those of the southern continent are confined to the coast.

JENNIE GILLILAND.

Nov. 7, 1894.

THE OLD AND NEW WORLD.

CONTRASTS.

THE OLD WORLD.	THE NEW WORLD.
History, Ancient.	*History, Modern.*
The principal mass of the Old World, Asia and Europe, extends from east to west, over one-half of the circumference of the globe.	The New World extends from north to south, over two-fifths of the circumference of the globe.
The mountain ranges run from east to west.	The mountain ranges run from north to south.
Asia,—Europe,—lies within the torrid, north temperate, and north frigid zones.	America comprehends all climatic zones, and hence presents a greater variety of phenomena.
Mountain ranges somewhat central.	The mountain range extends like a band along the western border.
Rivers of Europe small.	Great water basins. Rivers and lakes very large.
Traversed by different mountain chains.	One mountain chain, the Andes and Rocky Mountains.
Vast table-lands or plateaus. The mountains and plateaus of Asia cover five-sevenths of its surface.	Vast plains which form two-thirds of its surface.
Great volcanoes on the islands.	Volcanoes on the continent.
Coast-line of Europe very much indented.	Coast-line not so much indented as Europe, but more indented than Asia or Africa.
Inhabitants white, dark, black, etc.	Native inhabitants chiefly red men.
Animals: Lion, tiger, leopard, elephant, giraffe, cow, crocodile, nightingale, etc.	Animals: American lion, jaguar, panther, grizzly bear, buffalo, alligator, mocking-bird, etc.

RESEMBLANCES.

Land in two great masses, Europe and Africa in the west, and Asia in the east.	Land in two great masses, North and South America.
Isthmus of Suez connects Africa with Europe and Asia.	Isthmus of Panama connects North with South America.
The coast-line of Europe is more broken or indented than that of Asia, and still more than that of Africa.	The coast-line of North America is more broken or indented than that of South America.
Europe better adapted for human society than Asia or Africa.	North America better adapted for human society than South America.
Europe 1 mile of coast to 150 of surface; Africa 1 mile of coast to 620 of surface; Asia 1 mile of coast to 460 of surface.	North America 1 mile of coast to 230 of surface; South America 1 mile of coast to 380 of surface.
The direction of the land corresponds with the general direction of the mountain masses.	The same as in the Old World.
The southern extremity terminates in a point directed toward the southern ocean, while they go widening toward the north.	The same as in the Old World.
The peninsulas have nearly all the same direction.	The same as in the Old World.
The highest mountain in the Himalaya is a little more than 5 miles above the level of the sea.	The highest mountain in the Andes is nearly five miles above the level of the sea.

—*Tate's Philosophy of Education.*

Advanced Modeling.

PULP MAKING.

Few teachers of geography will dispute the value of relief-maps as aids in school work, but many are not acquainted with the proper use and preparation of the most serviceable materials for the construction of such maps. Many substances have been used in the class-room by the writer, but none have given greater satisfaction than *paper pulp*. This material is so clean, so pliable, and so easily manipulated that pupils and teachers having little knowledge of the art of modeling can make very good relief-maps, while the skillful in hand and artistic in soul can show results which will surprise all who are unacquainted with the many uses of the material known as *papier-maché*.

That the schoolboy of the past was an adept in the crude manufacture of papier-maché we must candidly admit, and we are free to say, from our own experience, that some of the present urchins are not far behind in the matter. The skillful caster of the paper "wad" relied upon its well-known plasticity and adhesiveness when he strove to decorate the ceiling with these marks of his lack of interest in his geography lesson. We have long since come to sympathize with him in the matter of disgust with that species of teaching in which the searching out of long lists of names of unimportant places formed so large a part, but it is only in recent years that we have learned to utilize the natural creative longing of the child and turn this "wad-making" to account.

Set the boys in the class at the work in the right way and they will soon learn to prepare a fine grade of papier-maché for

class use. The paper used may be the waste sheets from the pencil tablets, or common newspapers may be made into a fine, serviceable pulp scarcely tinged with gray. Tear the paper into small pieces not more than an inch square, and fill a common water-pail or jar with the bits of paper. Pour over this a gallon of boiling water, and let the paper soak four or five hours. Then *drain off the excess of water*, and macerate the mass by thrusting a rough stick down into it again and again, "jobbing" it until the whole is reduced to a pasty mass. After about fifteen minutes of energetic work, the "ne'er do well" of your class will present to you the best of paper pulp, very smooth and fine, taking impressions from the very lines of the hand. More than this, the boy will have learned that he can do some things well, and will be the most eager to apply the material to its intended use.

When the pulp is ready for use, the material may be used in the construction of relief-maps of all kinds. Mold these upon squares of pine board or heavy pasteboard, modeling the various relief features according to some good physical map. When the map becomes dry, it will be found that fairy fingers have been at work reducing and beautifying the whole. These maps may be tinted and finished with water-color as perfectly as the best Whatman paper.

The shore-line should be lightly tinted in blue by means of a brush dipped in a solution of indigo or Prussian blue. In this use of the bits of paper, we see illustrated the *philosophy of the remnants*.

The following method of folding a map scale is here given because it is believed that to insure a fair degree of accuracy in the drawing of the map of a continent, construction lines are essential wherever the best degree of success is desired. The scale of miles here presented is 400 to the inch, and by allowing 160,000 square miles per square inch, the approximate areas of

the continents may be calculated with ease. In the higher classes this work will not fail to arouse interest.

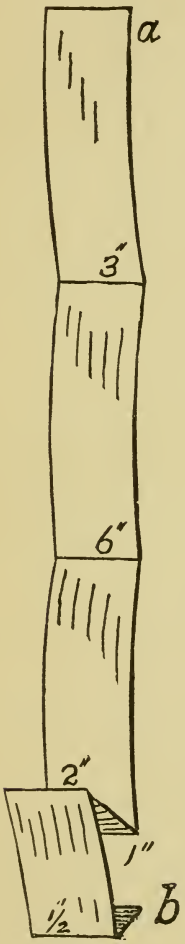


FIG. 49.

FOLDING THE MAP SCALE.

Take a strip of paper one inch wide and twelve inches long.

1. Mark the upper end of it *a* and the lower end *b* (Fig. 49).

2. Fold the strip in half, placing *b* over *a*. Mark the central crease 6″.

3. Fold the upper end *a* down to the central crease, and mark the new crease 3″.

4. Divide the lower half of the strip into three equal parts, and mark the lower crease 2″.

5. Fold *b* up to 6, and mark the crease 1″.

6. Reverse crease 2, and push the paper toward *a* so that 1 and 2 cannot be seen.

7. Turn the strip over so that all the marks are hidden from view.

8. Fold the end *b* up to touch the back of crease 1. Mark the new crease ½″.

If the strip of paper be taken as twelve inches in length, this scale may be used in measuring any number of inches or half inches. Thus the distance from *a* to 6 is six inches; that from *a* to 3 is three inches; from 2 to *b* is two inches; from 1 to 2 is one inch; from 6 to 2 is four inches, etc. Half inches may be laid off by the fold at the lower end of the scale.

This scale may be used in preparing the outlines for maps to be used in the regular work of the classes in

FIG. 50.
PULP MAP OF NORTH AMERICA.

geography and history, or in the making of outlines for pulp maps.

Diagrams for all of the continents may be made easily by use of this scale. It is not necessary that the piece of paper should be an exact number of inches long. The size of the map desired will fix the length of the strip, and the foldings as given above will show the proportional number of the new units. Any good maps of the continents may be used in making the outlines, but for convenience we have given diagrams for all the continents. When the strip is taken twelve inches long, the scale becomes 400 miles to the inch.

MAPS IN PAPIER MACHÉ.

North America.

The modeling of pulp maps should be done upon smooth pine boards, and the work mounted upon card-board afterward.

Thin boards may be fastened together by nailing cleats at the back. Upon such a molding-board the outline of the continent should be drawn to a convenient scale, say 400 miles to the inch. The accompanying diagram may be used for the purpose. In making a set of such maps it is well to adopt some uniform scale, since better ideas of relative sizes may thus be given.

Measure the vertical $AB = 11$ inches; the horizontal $BC = 6$ inches. Draw AC. Lay off $AD = 7$ inches, and $AG = 2$ inches. Draw $DE = 6$ inches, and $DF = 2$ inches. Draw AE, EC, FC, and GF.

For larger maps use double or triple these dimensions.

The pulp prepared and the outline drawn or traced, the pupils are ready to mold the map. Three or more pupils can work at a map at one time, and the teacher should allow each member of a class to do some of the work, especially if one large map of double the dimensions here given is made by the entire class.

The pulp should be spread out in a uniform flat layer, carefully molded up to the shore-lines of the continent. This may be done by using a pointed stick to cut and push back the pulp at the proper points. Thus the indented eastern coast, and even

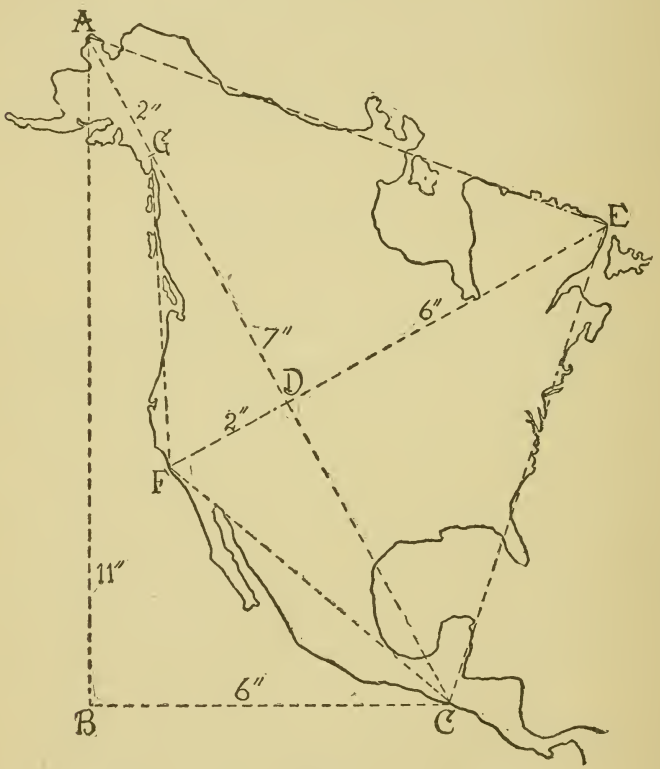


Fig. 51.

the labyrinth of islands of the northern coast may be modeled. *Do not slight the northern coast.* The islands, to be sure, may not be of so great importance as those farther south, but *habits*

of slighting the work should not here be formed. The production of the map of the continent outlined in the flat will be sufficient for at least one lesson-period. The children should be questioned in regard to the form of the continent, its indented coasts, and the general relation to other land bodies. The regular matter of the general lesson upon the continent should be given by some pupils while the others are modeling the map.

Next day the pupils can locate the parts of the continent where the plateau sections are to be represented by somewhat increased thickness of pulp.

Get a physical or relief map and study the plateaus and mountains of North America. Let the pupils dampen the parts where the plateaus are to be placed, and spread the fresh pulp out in a thin layer. The mountain ranges will rise above these sections,

FIG. 52.

but do not attempt to represent the mountains at this stage of the work. Put on the pulp in small quantities, and let the pupils be careful to make the work delicate. The plateau section which forms the basis of the Rocky-mountain system extends from the Arctic Ocean to the Isthmus of Panama. The broadest part lies within the United States, and is about 1000 miles in width. It is the broadest mountain system of the globe. In the molding, this plateau will be represented by a band of pulp about 5 inches wide (scale 200) at its broadest part, and covering the whole of Alaska, British Columbia, and Mexico, except the low section along the sea-coast. In like manner the long and mountainous isthmus of Central America may be represented. On the eastern side of the continent may be molded the narrow base of

the Appalachian Highlands; also the plateau of Labrador with the Height of Land extending completely across the Great Central Plain, and dividing it into northern and southern slopes nearly equal in extent. This should blend neatly into the flat portions first laid on.

Having finished the basal plateaus, the primary and secondary mountain systems may be molded. Place quantities of pulp in masses along the western coast upon the main plateau. Two lofty ranges cross the western plateau,—the Rocky mountains and the system of the Sierra Nevada. Numerous short ranges lie between. These mountains may be represented by making little elevations and modeling the peaks and ridges by means of a button-hook or smooth piece of wood. The highest peaks should be carefully located, and the lines of volcanoes represented. Thus we should locate the Central American group, the wonderful Mexican group with Orizaba and Popocatepetl, the California and Oregon groups, and the long line of the peninsula of Alaska. The secondary systems of the eastern part should be molded in much the same manner as the primary system, but of course should be made much lower in elevation.

Let the molded map now be set aside to dry. In two or three days there will be found upon the board a map reduced in thickness and yet keeping all the detail of the children's work,—a pure white map upon which fairy fingers would seem to have been working to reduce and render beautiful the whole. The map thus made will take water-color as perfectly as the best Whatman paper, and great beauty of finish may be given to the work. The entire shore-line should be lightly tinted in blue by means of a brush dipped in a solution of indigo or Prussian blue. The rivers should be carefully traced in pencil from source to mouth. Thus any mistakes can be corrected, and then the whole river system finished in ink. It will be well to make a careful

study of these systems, since the subject may be presumed to be more useful to our pupils than the study of systems more remote. No pupil who has traced these various river systems of North America, carefully following each river and tributary from source to mouth, can fail to have the general facts firmly impressed upon his memory. He will thus remember that the Mississippi, with its branches, affords a greater amount of inland navigation than all the streams, great and small, which drain Europe.

North America is noted for its great lakes. Along the line of contact of the oldest geological formations of the continent they stretch out in a series that includes the five great lakes of the St. Lawrence; Winnepeg of the Saskatchewan; and Athabasca, Great Slave, and Great Bear of the Mackenzie system. These should be represented on the map by depressions touched with blue water-color.

In advanced classes the work upon the water-centers of the continent may be easily shown by marks placed in the proper places. The volcanic peaks may be distinguished by gluing gold-foil upon the peaks molded to represent them. The volcanoes of Mexico and of Alaska should be marked in this way. After the map is completed it may be removed from the board, and then glued to a sheet of pasteboard or to a piece of muslin. Strips of wood nailed at the ends give finish to the map. In removing the pulp map from tbe board a case-knife may be used. The children will learn to make the maps very easily, and the teacher will be surprised at the results which may be obtained. The whole operation of modeling should be used as a *means* and not as an *end*, still the results will not be such that the teacher will care to see them entirely lost to service in the succeeding terms. We have in mind a school where the entire series of relief-maps of the continents—beautifully modeled in white and gold and blue, with a dash of sienna or yellow here and there to mark

a desert or a depression below the sea—*adorns* the walls of the school room, and the entire cost of the set was only *sixty cents.* But the feeling of *power* and *ownership*, which comes to those children when they see their own work, cannot be estimated in dollars and cents. And shall we then call it valueless?

South America.

According to a scale of 200 miles to the inch, South America would he represented 23 inches long and 16 inches wide. Use double the dimensions given in the diagram if a large map is wanted.

Draw the vertical $AB = 23$ inches; measure 6 inches to C; draw a horizontal line, and lay off $CD = 12$, and $CE = 4$; also $CF = 4$ inches. Draw AD, DB, AE, and EF.

Another excellent size is given by increasing each dimension by one half itself. On such plan AB becomes $17\frac{1}{2}$, $AC = 4\frac{1}{2}$, $CD = 9$, $CE = 3$, and $CF = 3$.

Having prepared the pulp and drawn the outline, the pupils are ready to mold the map. The pulp is spread out in a uniform layer about one-fourth inch thick, the pupils carefully modeling it up to the shore-lines. The production of the map of the continent outlined in the flat will furnish enough work for one lesson-period, but the children should be questioned in regard to the triangular form of South America, and the coast-line unbroken by great gulfs or large enclosed seas.

Then the pupils may locate the parts of the continent where the plateau sections are to be represented by somewhat increased thickness of the paper pulp. These sections are: 1. The Plateau of the Andes; 2. The Plateau of Brazil; 3. The Plateau of Guiana.

Of these plateaus, that of the Andes is by far the most promi-

nent. It should be represented on the map by an irregular band of increased elevation, varying from one-half inch to two inches in width (scale 200), and stretching along the entire western

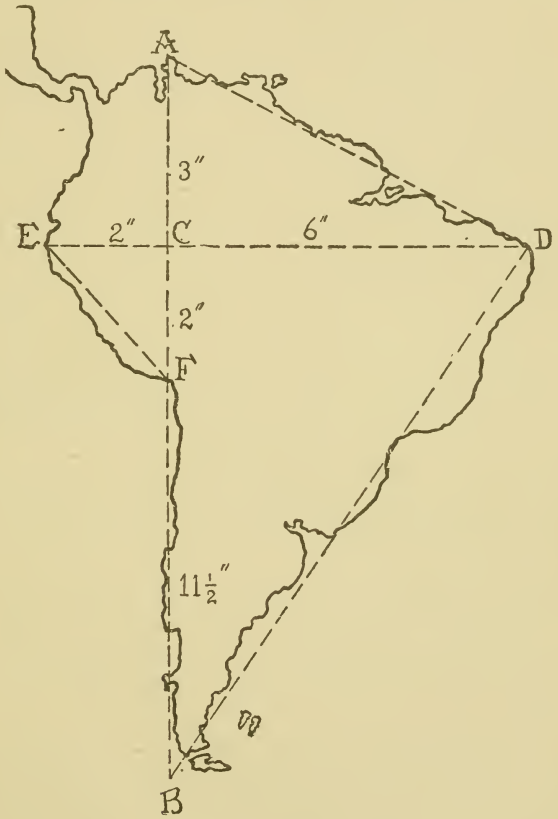


Fig. 53.

coast. This should blend into the flat portion which represents the Great Central Plain, extending along the whole eastern base of the Andes, and interrupted only by the low plateaus of Brazil

and Guiana. The great plain is usually considered under three divisions: 1. The Llanos of the Orinoco; 2. The Selvas of the Amazon; 3. The Pampas of La Plata. The water-sheds dividing these sections are insignificant in elevation.

The pupils may now proceed to mold the mountains of the continent. Place quantities of the pulp in parallel ridges or lines along the western coast upon the Andean plateau. These will form the border wall of the plateau, and should be molded into peaks and elevations by means of a spatula or a common steel button-hook. The elevations should not exceed one-quarter inch in height, The Andean system should be formed of two lines of elevations in the central portion, of three lines at the northern extremity, and of one at the southern extremity. The general chain of the Andes is nowhere broken through, and thus the great mountain system forms a complete separation between the waters which fall into the Pacific and those which flow into the Atlantic.

The chief peaks of the Andes, such as Aconcagua, Illampu, and Nevada de Sorata, should be located, as should also the various groups of lofty volcanoes. The broad table-land of Brazil should be crossed by several irregular ranges of low mountains, the highest ranges situated along the southeastern coast. The mountains of Guiana, consisting of the Acarai and Pacarayma ranges, may be represented by elevations somewhat higher than those of Brazil.

A full lesson period may well be spent in tracing the courses of the rivers. Do this at first in pencil,—mistakes can be erased, —and then go over the lines with blue ink or water-color. The rivers should be traced from source to mouth. The main tributaries of the Amazon should be shown upon the map. In a complete map the wonderful little river, the Cassiquiare, which connects the Rio Negro of the Amazonian system with the Orinoco,

will be traced in position. La Plata and its tributaries draining the Pampas of the south, should also be shown.

In the central portion of the plateau section of the Andes, a little depression may be painted blue to represent Lake Titicaca, the highest *large* lake in the world. The Desert of Atacama may be shown by a dash of color, such as sepia or sienna.

The groups of volcanoes may be distinguished by gluing small pieces of gold-foil upon the tips of the elevations molded to represent them. Thus may be represented the volcano Tolima, and the linear groups of the plateau of Quito containing Chimborazo and Pichincha, Cayambe, and the famous Cotoapaxi, the highest active volcano in the world. The volcanoes of the central group, Arequipa and Sahama, and the remarkable Chilean range, includ-

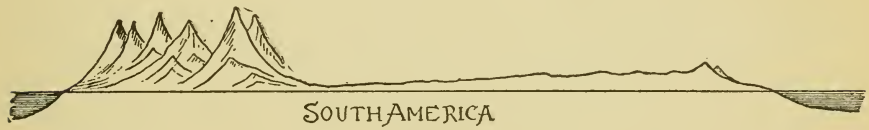


FIG. 54.

ing Antuco and Corcovado, should also be shown upon the complete map.

The map should be removed from the board, and glued to a sheet of heavy pasteboard. A thin case-knife passed under the map will readily enable one to raise it from the board. Large maps may be fastened to the mounting card by brass paper-clasps. Strips of wood tacked to the upper and lower edges of the chart will give completeness to the map.

Use the modeling as a means, not as an end. Teachers will be surprised to find that the children will make maps far more beautiful than anything they could draw in the given time, if they are allowed to make use of this simple medium in molding. Pupils in my own classes have improved upon my instructions,

and have modeled maps in which light gray pulp made from newspapers represented the lowlands, while the pure white pulp was used for the mountains and plateaus.

A single trial will convince any one of the value of the material.

Africa.

To make the diagram for Africa, draw the horizontal base line $AB = 12$ inches. Measure westward $BC = 1\frac{1}{2}$ inches, and bisect AC at D. Lay off $DE = 4\frac{1}{2}$ inches north, $DF = 1$ inch east, and $FG = 8$ inches south. Draw the horizontal $GH = 1\frac{1}{2}$ inches east. Lay off $DI = 1$ inch to the west of D. Draw GI, and make $IK = 1\frac{1}{2}$ inches. Draw GA, and the horizontal westward through K to L in GA. Lay off $DM = 3$ inches northward from D, and $MN = 3$ inches eastward from M. Draw the lines MN, NC and BH. Describe the arc AE with I as a center and AI as the radius.

Draw the outline of the continent, and then model the map according to the directions given for the work upon North America. It will be noticed that Africa is the largest of the continents, after Asia. It has a uniform contour, and consists of one great elevated plateau. There are no great, connected mountain systems. Its plan of structure combines that of the Old World and of the New.

In form the continent resembles South America, but the primary mountains are found in the eastern instead of in the western part. Model the main peaks of these mountains, Kenia and Kilma Njaro. Of the two ranges on either side of the Victoria Nyanza, the western or Ruwenzori range is that which was anciently called "The Mountains of the Moon."

The secondary mountain ranges are the Atlas, the Cameroons, and the Snow mountains. Model these mountains in position,

FIG. 55.
PULP MAP OF SOUTH AMERICA.

and mark the general slope of the continent from south to north, as shown in the basin of the river Nile, extending over 30 degrees of latitude. Trace this river in position, and also the Congo,

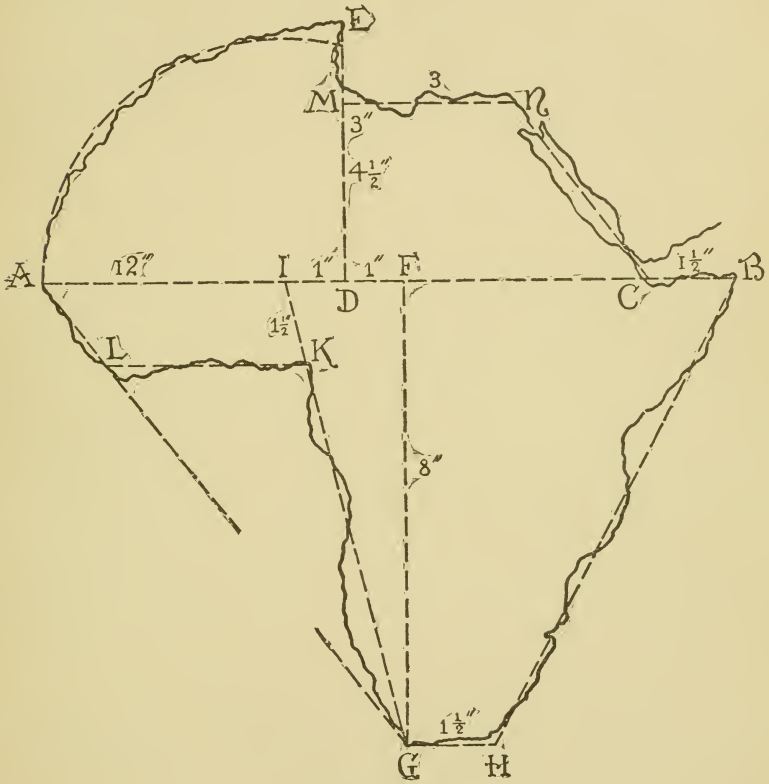


Fig. 56.

Niger, and Zambesi. Although Africa has these great rivers, it is the dryest of the continents. When the pulp map is ready, mark the position of the great lakes Victoria Nyanza, Albert Nyanza, and Tanganyika; also Lake Tchad.

Locate the great Desert of Sahara, the Libyan and Nubian deserts in the north, and the Kalahari desert in the south. These may be tinted with sienna.

The Nile river overflows its banks for several months each year. It thus stretches a band of verdure across the desert region through which it flows to the sea. This beautiful valley, with the delta at the mouth, was the seat of Egyptian civilization, next to that of the plains of the Tigris and Euphrates, the oldest in the world.

Australia.

Draw a horizontal base line, *AB*, from Shark Bay to Brisbane, making it 6 inches in length (Fig. 57). Lay off $2\frac{3}{4}$ inches from *A* to *C*, and draw a line perpendicular to *AB*. Measure 3 inches upward to *D* (Victoria, North Australia), and $\frac{3}{4}$ inch to *E* (Great Bight). Draw $DF = 1\frac{1}{2}$ inches, parallel to *AB*. Measure 1 inch to the left from *B* to *G*, and draw $GH = 3\frac{1}{4}$ inches, perpendicular to *AB*. The point *H* locates Hobarttown in Tasmania. Draw through *A* the line *IJ* perpendicular to *AB*, and make $AI = 1$ inch (Northwest Cape), and $AJ = 1\frac{1}{2}$ inches southward from *A*. Draw *DB*, *FB*, *BH*, *HE*, *EJ*, and *DI*. Locate the head of the Gulf of Carpentaria at $K = 1\frac{1}{2}$ inches from *D*. Draw the coast-line.

Draw the outline of the continent, or, if more rapid work is desired, the shore-line may be traced by placing a piece of black tracing-paper between the board and the map, and then passing the pencil point around the entire outline.

Mold the flat layer of pulp as given in the directions for molding the other continents; then mold the plateau sections and watersheds.

The typical structure of a continent is as follows:

1. A *primary highland region* on one side.

2. *Secondary highlands* on the opposite side, trending toward the primary.

3. A *depression* between the two systems.

Australia well illustrates this plan of structure in its simplest form, and so asserts its claim to the title of continent. No island, however great its extent, shows such conformation. It should be noticed that Australia resembles Africa more closely than any other continent.

On the eastern side of the continent, the basis of the predominant system of mountains should extend from York Peninsula on the north to Portland Bay on the south. Let the basin of the Murray be shown, and also the valleys of its tributaries, the Darling and the Lachlan. Mold the lowlands of the lake region, and mark the Grey and Flinders ranges. The land in the west and northwest regions of Australia has the character of a tableland of moderate height studded with groups of small mountains. On the general level of the tableland are vast plains, sometimes sinking into low swamps. Nearly the whole of this section should be finished as a low tableland.

In the southern portion of the continent, near the Great Australian Bight, lies the Great Victoria Desert. This may be marked upon the relief-map by an irregular patch of buff color.

The ranges of the predominant mountain system may now be molded. The Australian Alps, containing the peaks Mount Kosciusko and Mount Hotham, the Blue Mountains, Liverpool Range, etc., belong to this system. In the north and west are secondary systems of comparatively small elevation. No considerable mountains have been discovered in the interior of the continent, but there are many low ranges and some groups of mountains. Central Mount Stuart, Mount Leichhardt, Mount Wilson, and others may be shown on the molded map. The low water-

shed between the rivers of the Gulf of Carpentaria and the Victoria river may also be represented. The rivers should now be outlined with a pencil, taking care that the courses be run from source to mouth. This will be found one of the most interesting

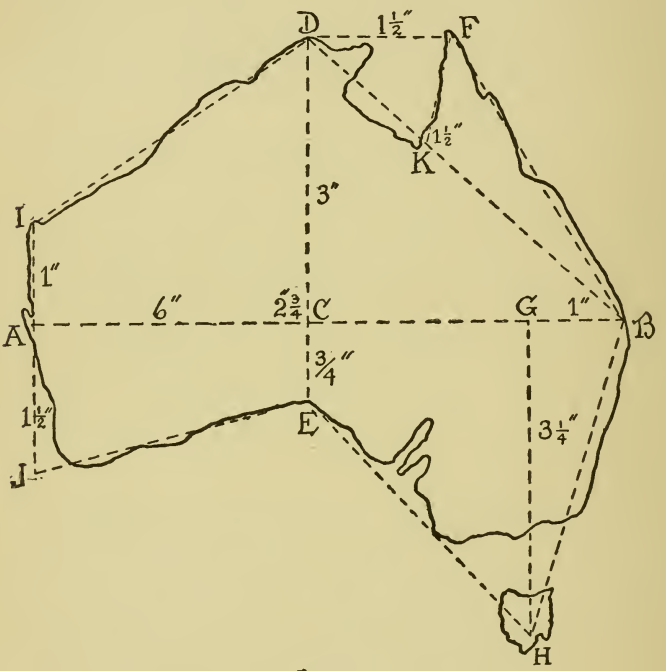


FIG. 57.

and instructive lessons for the pupils. Lakes Eyre, Gairdner, Torrens, and Austin should be located and marked.

The Great Barrier Reef, extending one thousand miles along the northeastern coast, may be represented by a line in white.

It will add much to the beauty and practical utility of this map if the islands of the East Indies be molded in their relative

positions in regard to Asia and Australia. The numerous volcanoes of the section, when shown upon the map, will readily suggest the name "Sea of Fire" for the Pacific.

Asia.

Draw a base line *AB* from the Bosphorus to Yezo, and let this be 14 inches long (Fig. 58). From *A* drop a perpendicular 6 inches to *C* (Bab-el-Mandeb). Draw the perpendicular *BD* 5½ inches to Berhing Strait. Lay off *AE* to the right 5½ inches, and drop the perpendicular 7 inches to *F* (Cape Comorin). Draw the horizontal line *FG* 4½ inches to the right (Cape Cambodia). From *A* lay off to the right 3½ inches to *H* (head of Caspian Sea); also 6½ inches to *I*, from which erect the perpendicular *IJ*, 4 inches to *J*, the northern extremity of the Urals. Draw *HJ*, *JD*, and *BG*. Find the point *K* (Calcutta) where the lines *FD* and *HG* would intersect. Find, also, the point *L* (Hydrabad) where *HF* and *CB* would intersect. Complete the outliné by any good map. This outline of Asia is arranged for the meridian of Calcutta.

Having drawn the outline of the continent and noted its remarkable peninsulas and chains of islands, the pupils may proceed to mold the mountain masses of the continent in detail. Model the immense mass of elevated land that forms the interior of the continent. This mass is crowned by the great mountain-knot of Pamir—"the roof of the world." Radiating from this we find the highest mountains of the globe. Four great ranges, the Himalaya, Kuen lun, Karakorum, and Yung Ling mountains extend from east to west, and form mountain barriers crowned with colossal mountain peaks.

After the great plateau of Thibet is molded, these ranges may be modeled in position. Some of the highest peaks should be

shown in position. Mounts Everest, Kunchinjunga, Dhawalaghiri, and other important crests will appear upon a good map.

Model the secondary mountain systems according to any good physical map.

Notice the position of the great plains of Asia. Here all of

FIG. 58.

the great plains are on the borders of the continent, terminating the slopes from the main highlands which are in the center. Thus the rivers of the continent find their way to the sea in long and nearly parallel courses, with little tendency to combination. This fact will become very clear to the pupil as he traces the

courses of the rivers from their hydrographic center in the great plateau down the slopes and into the ocean. Thus the Amoor, the Yang-tse-kiang, Hoang-ho—that great "Sorrow of Han"—will be traced; so also the Ganges, Brahmapootra, and the Indus; the Arctic rivers Obi, Yenisei, and the Lena.

The great desert regions of this continent should be shown by coloring the regions with a light wash of sienna, or light brown. Lakes and seas should also appear in position.

Europe.

Draw the line $AB = 7\frac{1}{2}$ inches to represent the base-line from Oporto to the eastern extremity of the Caucasus Mountains. Lay off 4 inches from A to C, and draw through C a line perpendicular to AB. Lay off upon this line $4\frac{1}{2}$ inches to D (North Cape); then $3\frac{1}{2}$ inches to E, the head of the Baltic Sea; and 2 inches to F (Riga). Lay off $CG = 1\frac{1}{2}$ inches southward (Cape Matapan). Draw a horizontal through D, and lay off 3 inches westward to H (North Cape, Iceland), and lay off DI, $2\frac{1}{2}$ inches eastward to a point in the Ural Mountains. Draw AD and BI, and drop a perpendicular from H to AB at J. The line HJ cuts AD at K (Brest). Draw KG, cutting AB at L (Genoa). Draw KF and CH, cutting KF at M (Copenhagen) and AD at N (The Naze). Draw IG, cutting AB at O, the mouth of the Danube. At A draw a line perpendicular to AB, and make $AP = \frac{1}{2}$ inch (Cape Finisterre), and $AR = 1$ inch (Strait of Gibraltar). Draw the lines PJ and RL, and complete the outline of the continent.

After the pulp has been prepared and the outline of the continent drawn, the pupils may be allowed to mold the map. The production of the map of this continent outlined in the flat will be sufficient for one or two lesson-periods. Europe has a very long line of junction with Asia, therefore the best maps will

show parts of this outlying continent. In some cases it is well to model Europe and Asia as one great land mass. In order that the Mediterranean Sea may be properly shown, Africa should be modeled in part. These may be shown simply in the flat, without the mountains and plateaus.

FIG. 59.

Procure a good physical map and study the plateaus and mountains of Europe. Dampen the parts where the plateaus are to be placed, and spread out the fresh pulp in a thin layer. Put on the pulp in small quantities, and take care to make the work delicate.

Europe in its western part is mainly a network of moun-

tain chains, without very extensive plateaus. The whole eastern part consists of a vast low plain continued in a moderately wide strip bordering the Baltic and North seas, and extending to the Bay of Biscay. The dividing line between these two sections is formed by the secondary mountain system consisting of the Carpathian, Sudetic, and Riesen mountains, and lower ranges extending nearly to the shores of the North Sea. The continent may be considered naturally under two great divisions, High Europe and Low Europe. A line drawn from the mouth of the Rhine to that of the Dniester marks this division.

Mold the basis of the central highlands, leaving narrow bands of depression to mark the valleys of the Danube, the Po, and the Garonne, etc. Cover the three peninsulas, the Spanish, Italian, and Grecian, which constitute the southern highlands. The eastern part of the Scandinavian peninsula belongs to the Great Low Plain; the western part forms the Scandinavian Plateau. On the coast of Norway are found those most remarkable formations—deep, narrow, vertical arms, or rather *fingers* of the sea—known as *fiords*. The sea is thus admitted to the very heart of the Scandinavian Alps, and the perpendicular walls of these transverse valleys are often several thousand feet high. The fiords may be represented by transverse cuts in the shore-line of the plateau.

Low Europe is bordered on nearly every side by mountains. On the east are the Urals, on the south the Caucasus, on the southwest the secondary highlands of the continent, and on the northwest the highlands of Scandinavia. The greater part of this section should be left in plain relief, since it is nearly uniform in surface and character, and without natural subdivisions, if we except such as are made by the inland seas. This plain is slightly elevated near the centre, where the Valdai Hills, 1100 feet above the sea-level, form the principal watershed of Europe.

Having located the basal plateau sections of Europe, it now remains to mold the primary and secondary mountain systems. The main system is composed of a highly complex series of mountain chains extending along the northern shores of the Mediterranean in a great curve from Gibraltar to Asia Minor. The central part is highest, the Alps forming the culminating point of the continent in Mont Blanc, 15,787 feet high. The sharp peak of the Matterhorn, the broader Wetterhorn, Monte Rosa, and the Pic du Midi should be molded in miniature. More than four hundred peaks of the Alps rise above the snow-line.

The modeling of mountain ranges and the formation of valleys are closely connected. When elevations were first formed on the surface of the earth valleys appeared between them as necessarily as shadows follow light. The Alps are formed of numerous ranges divided by comparatively deep valleys, which tend toward parallelism with the general direction of the whole mass; but in many parts deep transverse valleys intersect the prevailing directions of the ridges, and serve to facilitate the migration of animals and plants, as well as to increase the trade between nations. These deep depressions between mountains are called passes. The chief passes of the Alps have been known and frequented from a period antecedent to authentic history. The famous Pass of St. Bernard, the Pass of St. Gotthard, and the Simplon Pass may be represented in place. The Pyrenees and the Cantabrian Mountains, with the Apennines and Balkans complete the main system. The secondary mountain chains of Europe may now be molded. The ranges of Scandinavia, the Caucasus, with Mount Elburz, the highest peak of Europe (18,526 feet), and the Urals should be located. The latter should have a very broad base, since the slopes, both on the European and Asiatic sides, are so gradual that the traveller looks upon the elevations rather as pine-clad heights than as a great mountain chain.

The British Isles form part of the great continental plain, but are separated from it by submarine plains, situated in the North Sea, 300 feet below the surface. The inconsiderable elevations of Scotland and Wales may be shown by slight ridges in relief.

Some of the snow-capped peaks of the Pyrenees, the Scandinavian Alps, and the Caucasus ranges should be represented.

Outline the rivers in pencil, and then trace over in blue ink. The snow-crowned Alps form the hydrographic center for High Europe. Even in the hottest and driest seasons the reserves, accumulated in the form of glaciers during a long preceding period of years, are available to maintain the regular flow of the greater streams. The entire system of the Alps is drained by four large rivers, the Rhone, the Danube, the Rhine, and the Po. The Danube, rising in the Black Mountains, follows the general eastward slope, and passes, through transverse gaps, a number of ranges lying directly across its course. The Rhine and the Rhone pass through transverse valleys in the Swiss Alps and the Jura.

The center for Low Europe lies in the Valdai Hills, from which streams radiate in every direction. These streams all enter the four inland seas which border upon the great European plain. The longest river of Europe, the Volga, flows toward that vast depression which separates Europe from Asia. That portion of the depression which is below the sea level may be shown on the map by a light wash of a greenish-yellow color.

Unless the map be made upon a large scale, it will not be necessary to represent the mountain lakes of Europe. The lakes which are found in the lowlands which surround the Baltic Sea should be shown. These are lakes Ladoga and Onega in Russia, and Wener and Wetter in Sweden.

Complete the map by placing gold-foil upon the peaks representing the volcanoes Etna, Vesuvius, Stromboli, and Vulcano; also Mount Hecla and the other volcanoes of Iceland.

PUTTY-MOLDING.

Among the many art media which are at the service of teachers of geography in the construction of relief-maps, common putty occupies no insignificant place. This material is pliable and easily manipulated, therefore teachers and pupils possessing but moderate abilities in the art of molding can readily produce very serviceable relief-maps.

In order to get the best results, colored putty should be used. There are certain conventional tints which may be used to represent the various natural conditions of land and its variations of level. The teacher who intends to construct serviceable relief-maps should procure putty in the following colors, which any glazier or painter will readily make:

1. GREEN.—The color known as "Nile green," formed by mixing with the putty a little Prussian blue and chrome yellow, making a light tint.

2. BROWN.—A warm shade of brown, formed by mixing umber and Indian red with the putty.

3. YELLOW.—A tint resembling "Naples yellow," formed by adding yellow ochre to the putty.

4. BUFF.—A shade formed by mixing equal quantities of (2) and (3). Raw sienna gives nearly the same color.

In a relief-map of any continent, lowlands and valleys may be represented in green, mountains in brown, lakes in blue, and deserts in buff. "Naples yellow" is the conventional color for plateaus, but in most cases it will be better to represent both highlands and mountains in brown.

Relief-maps should be molded upon boards specially prepared for the purpose. For use in the class-room a very convenient form may be made by nailing strips on the ends of short lengths of thin pine boards. The strips prevent warping. The molding-

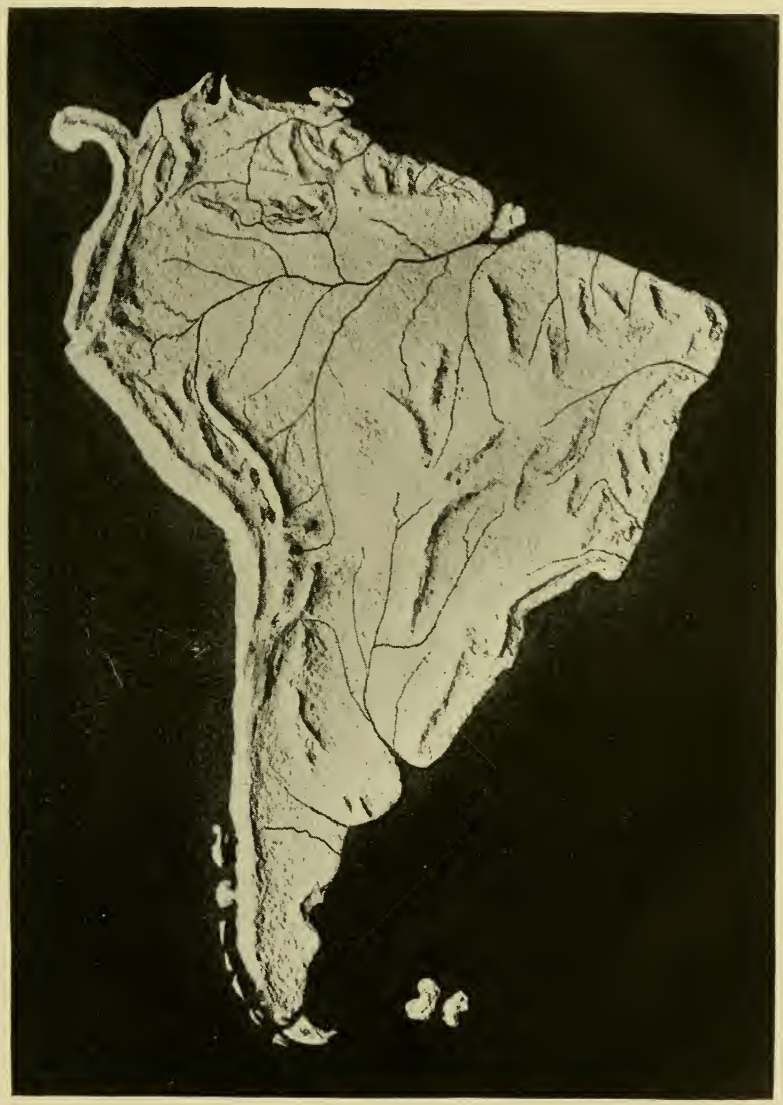


FIG. 60.

MAP OF SOUTH AMERICA IN PLAIN PUTTY.

boards used for the continents may be 13 by 16 inches. Since the map is intended to remain upon the board, the general appearance of the work may be much improved by painting the boards light blue. The continent and its neighboring islands will then stand out in strong relief. Instead of the thin boards here recommended, squares and oblongs of book-board may be used; but the putty will not adhere so readily, and the pieces are apt to warp.

If a set of relief-maps of the continents be constructed, it will be well to adopt some uniform scale, since better ideas of the relative sizes can thus be obtained. With the boards 13 by 16, a scale of 400 miles to the inch may be employed. The following directions are such as may be found useful in locating the main points in the outline of South America.

South America.

Draw a vertical line *AB*, and make it 11½ inches long. Measure downward 3 inches upon this line to the point *C*, through which draw the horizontal line *ED*, making *CE* 2 inches to the left, and *CD* 6 inches to the right. Lay off on *AB* 2 inches from *C* to *F*. Draw the lines *AE*, *AD*, *DB* and *EF*.

MOLDING THE MAP.

Locate upon the board the points *A*, *B*, *C*, *D*, *E*, and *F*. Take a small ball of green putty (No. 1) about one inch in diameter and soften it in the hand until thoroughly pliable. Place the piece of putty in the center of the outline and press it outward to the points marked. Make the layer of green perfectly flat and about $\frac{1}{12}$ inch thick. Mold in the shore-line according to the outline as given in the text-book, using a pointed stick in

making the indentation of the coast. Finish the flat surface by passing the palm of the hand lightly over the whole.

Some teachers may prefer to give the children the outline of the shore and let them mold to the limit thus set. In that case, a good plan is to cut out a pattern in thin cardboard, and trace around the edge. The method employed may be varied to suit the end desired. With very young children the outline must be given if *accurate* maps are desired at once.

Whatever be the method employed, it is probable that the production of the map of the continent *outlined in the flat* will furnish enough work for each member of the class during one lesson-period.

Pupils should be questioned in regard to the triangular form of the continent, and the coast-line unbroken by great gulfs or large enclosed seas.

Prepare some brown putty (No. 2) and spread it out in thin patches upon the parts of the continent where the plateau sections are to be represented.

These sections are :

1. The Plateau of the Andes.
2. The Plateau of Brazil.
3. The Plateau of Guiana.

Of these plateaus, that of the Andes is by far the most prominent. It should be represented on the map by an irregular band in brown varying from one-quarter inch to one inch in width, and stretching along the entire western coast.

The portion of the map left green will represent the Great Central Plain, which, extending along the whole eastern base of the Andes, is interrupted only by the low plateaus of Brazil and Guiana.

This great plain is usually considered under three divisions :

1. The Llanos of the Orinoco.

FIG. 61.

MAP OF AUSTRALIA IN COLORED PUTTY.

2, The Selvas of the Amazon.

3. The Pampas of the La Plata.

The watersheds dividing these sections are insignificant.

The student may now proceed to mold the mountains of the continent. Roll out between the palms of the hands little strips of brown putty, and place them in parallel lines along the western coast upon the Andean plateau. These will form the border-walls of the plateau, and should be molded into peaks and elevations by means of a horn spatula or a common steel button-hook. The elevations should not exceed one-eighth of an inch in height. The system should be formed of two lines of elevations in the central portion, of three lines at the northern extremity, and of one at the southern extremity. The general chain of the Andes is nowhere broken through, and thus the great mountain system forms a complete separation between the waters which fall into the Pacific and those which flow in the Atlantic.

The chief peaks of the Andes, such as Illampu, Aconcagua, and Nevada de Sorata, should be located, and may be marked with little touches of white paint. The various groups of lofty volcanoes may be readily distinguished by deftly placing small pieces of gold-foil upon the tips of the elevations molded to represent them. Thus may be represented the volcano Tolima, and the linear groups of the Plateau of Quito, containing Chimborazo and Pichincha, Cayambe, and the famous Cotopaxi, the highest active volcano in the world. The volcanoes of the central group, Arequipa and Sahama, and the remarkable Chilian range, including Antuco and Corcovado, should also be shown upon the map.

The broad tableland of Brazil should be crossed by several irregular ranges of low mountains, the highest ranges situated along the southeastern coast.

The mountains of Guiana, consisting of the Acarai and Paca-

rayma ranges, may be represented by elevations about equal in altitude to those of Brazil.

The next lesson may consist of tracing the courses of the rivers of South America. If the students can be supplied with little perforating needles such as are used in the kindergarten, these may be used in marking out the river-courses. A sharp penknife may be used instead.

The rivers should be traced from source to mouth. The main tributaries of the Amazon should be shown upon the map. In a complete map the wonderful little river, the Cassiquiare, which connects the Rio Negro of the Amazonian system with the Orinoco, will be traced in position. The La Plata and its tributaries draining the pampas of the South should be shown.

In the central portion of the plateau section of the Andes a little depression may be lightly touched with blue paint to represent Lake Titicaca, the highest large lake in the world.

The Desert of Atacama, on the western coast of the continent, may be represented by a small patch of buff putty. The shade may be formed by mixing No. 2 and No. 3.

SUBDIVISION OF THE WORK.

Lesson I.—Basal lines or outline.

Lesson II.—Flat layer of green, with shore-line.

Lesson III.—Plateaus and deserts.

Lesson IV.—Mountains and rivers.

Lesson V.—Lakes and details of finish.

Putty may be kept very soft and pliable by covering it with water. When it is needed for use a portion may be placed in hot water, and it will then become exceedingly soft, but not adhesive or disagreeable in any way.

Practice-boards, consisting of plain lengths of common pine, may be used until some little skill is attained in the

manipulation of the putty. Colored putty costs about ten cents a pound.

By following the directions given in a preceding section the other continents may be molded in colored putty.

MOLDING IN PLASTER OF PARIS.

Plaster is not a medium which will be found quite so useful for general purposes as some other media, but there are still many cases in which it is the best substance to employ. Where it is desirable to make many copies of a given map, and the matter of time is the chief element to be considered, or where it is necessary that a very high degree of finish shall be given to the work, then it becomes the medium *par excellence.* The best method to be pursued in the production of a set of copies of a relief-model is as follows:

Let the relief to be copied be one of the delicate putty maps, made according to the directions given under the heading "Putty Molding." Brush lightly the whole surface of the map with a thin coating of oil, wax, or graphite. Tack a rim or border of thin strips, one inch deep, completely around the board upon which the map is molded. Prepare the thin paste of plaster, and pour it into the mold thus made. Let it become firm, and then remove it by tapping smartly the strips nailed to the sides of the board. This becomes a new *matrix* from which any number of copies can be made. Nail some inch strips together to form a confining frame for the matrix. Coat the matrix with oil or graphite, and then fill with plaster. A few sharp taps will allow the removal of a perfectly clean and white copy of the original map. This may now be elaborated by fine work upon the rivers, etc., and may be made to take any of the delicate tints employed in water-color painting. Where it is desirable to make maps for

use in all the ward schools of a city system, many of these clean, white copies may be made. By having the various continents molded in different schools, fine sets of relief-maps may be made for use in all the schools of a city.

This medium, like the papier-maché, has the great advantage of taking water-colors and India ink well, and thus readily lends itself to the highest grade of work. In order that the student and teacher may be able to avail themselves properly of this beautiful medium, we give the following list of desirable colors to be used in tinting:

China white.	Yellow ochre,
Lemon yellow,	Raw sienna,
Vermilion,	Venetian red,
Rose madder,	Carmine,
Burnt sienna,	Raw umber,
Sepia,	Gamboge,
Indigo,	Emerald green,
Prussian blue,	India ink.

All the conventional tints employed in geographical representation may be obtained from these, and their use will add greatly to the beauty of the maps made. Of course the only limit is the artistic talent of the molder.

It is understood that the maps from which the molds are made must be perfectly dry and hard, otherwise the matrices cannot readily be made.

MAPS OF FINEST FINISH.

A simple extension of the processes given before will give a method for production of relief maps of a quality not surpassed in this country. Let a plaster mold be made as in the directions given, and into this pour a thin layer of fine, smooth pulp, con-

FIG. 62.
MAP OF ASIA IN PLASTER OF PARIS.

sisting of macerated paper. This may then be backed by a thick, coarser pulp made of manilla, brown paper, etc.

Another process which gives excellent results is as follows:

Soak sheets of Whatman's best draughting paper in a size of glue and paste. Take pieces of the required dimensions, and, pasting them together in layers, press them down into the mold of the map. Dry these layers by placing the mold in an oven; then back the layers with pulp, or with plaster of Paris. When it is desirable to finish the map in water-colors, the first layer should be soaked in pure water, and the size or paste be applied to one side only and after the sheet has been laid in the mold. Maps made in this way become very strong and durable, and are capable of taking very high finish.

We hope the day is not far distant when maps of the above description will be made in great numbers in our own country.

ONE USE OF RELIEF MAPS.

The following double lesson given by Mr. Small, a pupil-teacher, shows one use which may be made of the relief-maps after they have been molded by the pupils.

Subject: Cultivated and Uncultivated Products of South America.

Point.—1. To obtain from the pupils the statements given in the plan below.

2. To fix firmly in their minds the knowledge gained.

Preparation by Pupils.—1. Study of the text in a good Intermediate Geography.

2. A little well-directed reading.

3. Acquired concepts of the general physical features of the continent, through previous work and molding the relief in putty, clay, or paper-pulp.

4. Individual maps; each pupil's molded work before him during the recitation.

Preparation by the Teacher.—1. Selection of lesson-plan.

2. Consultation of Manual of Commerce.

3. Molding of individual map.

Plan and Matter.—1. Review of previous lesson on physical features.

2. Vegetable products are—cultivated and uncultivated.

3. Cabinet-woods, dye-woods, palms, india-rubber, cinchona-sarsaparilla, Brazil nuts, and cassava are the principal *wild* productions of South America.

4. The cabinet-woods,—mahogany, rosewood, ebony, etc.,—the dye-woods, india-rubber and palms, are mainly found along the Amazon.

5. Cassava is produced in greatest abundance in Brazil.

6. Cinchona or Peruvian bark is obtained in Peru, United States of Colombia, Ecuador, and Bolivia.

7. Coffee, sugar, cotton, tobacco, indigo, and rice are the principal *cultivated* vegetable productions of South America.

8. Brazil yields more than half the coffee used in the world.

9. Brazil is the chief coffee, sugar, and cotton producing district of South America, but Guiana and Venezuela are also important districts.

10. Venezuela and Brazil produce indigo.

11. General drill in spelling, etc.

METHOD.

Teacher.—Who can tell me upon what the vegetable productions of a country depend?

Harry.—Upon the soil and climate.

Teacher.—Since the soil and climate, as you have learned, differ much in the various countries, what must follow in regard to the productions?

Bertha.—The productions are different.

Teacher.—In your last lesson you have molded South America. Etta may tell me to which hemisphere the continent belongs.

Etta.—South America lies in the Western Hemisphere.

Teacher.—In what zones does the continent lie, Charlie?

Charlie.—It is in the Torrid and South Temperate Zones.

Teacher.—Through what part does the equator pass, Gracie?

Gracie.—Through the northern part.

Teacher.—What portion of the continent is in the Torrid Zone, Helen?

Helen.—About three-quarters of the continent lie in the Torrid Zone.

Teacher.—Class may show me where the equator crosses the continent.

Each pupil points out the place upon his map.

Teacher.—Where is the chief mountain system situated, Ella?

Ella.—It extends along the entire Western coast.

Here the teacher conducts a rapid review of the previous lesson upon physical features, climate, soil, etc. The pupils locate the various parts named. Much of the zest of recitation appears to come from the fact that each child is dealing with a *map* which he has MADE his own.

Teacher.—Since the greater part of South America is in the Torrid Zone, what kind of productions should we expect to find, Lottie?

Lottie.—The productions common to the Torrid Zone, mainly.

Teacher.—What two general classes of vegetable productions do we have, Edna?

Edna.—Cultivated and uncultivated.

Teacher.—Name some cultivated products, Harry?

Harry.—Corn and wheat.

Teacher.—Helen may name some uncultivated productions we have in this country.

Helen.—The timber-trees.

Teacher.—Who can name some uncultivated vegetable products of South America?

Etta.—Cabinet-woods.

Teacher.—What are cabinet-woods?

Etta.—Wood used in making fine furniture.

Teacher.—Clara may name some.

Clara.—Mahogany and rosewood. Chairs and sofas are sometimes made of mahogany, and pianos of rosewood.

Teacher.—Harry?

Harry.—Sister has an easel made of satinwood and ebony.

The children are asked to spell these various words, and the teacher writes a list upon the blackboard.

Teacher.—Name other uncultivated products of South America, Edna?

Edna.—Dye-woods.

Gracie.—Cocoanuts and other fruits of palms.

Ella.—India-rubber.

Teacher.—What is india-rubber, Helen.

Helen.—India-rubber is a gum-like or resinous substance obtained from the milky sap of a tree.

Teacher.—What use is made of it in this country, Charles?

Charles.—It is used in making boots, shoes, water-proof clothing, erasers, and many other articles.

Teacher.—There is also a tree called cow tree or milk tree, which yieds an abundance of nutritious sap. From what are all of these various things obtained, Gracie?

Gracie.—They are obtained from trees.

Teacher.—Where do we always find trees, Mac?

Mac.—In forests.

Teacher.—Where do we find the principal forests of South America Lottie?

Lottie.—In the plains of the Amazon.

Teacher.—Lawrence may tell us the name which is sometimes given to these plains.

Lawrence.—Selvas.

Teacher.—What does that word mean, Mac?

Mac.—Woods or forest plains.

Teacher.—Where are the dye-woods, cabinet-woods, india-rubber trees, cow trees and palm trees of South America found, Edna?

Edna.—In the forests along the banks of the Amazon, in Brazil.

Teacher.—Class may point out on maps. Yes, that is right. But have we named all the wild products, Harry?

Harry.—I can name two others—Peruvian bark and sarsaparilla.

Teacher.—Any others, Charles?

Charles.—Cassava or tapioca.

Helen.—Brazil nuts.

Teacher.—In what zone is cassava produced?

Gracie.—In the Torrid Zone.

Teacher.—In what particular country of South America is it produced, Harry?

Harry.—In Brazil.

Teacher.—Class may point out the country. Yes, that is right, Charles. Now we have all found it. What is the name of the plant from which cassava is made?

Helen.—It is called the manioc shrub, and the root when scraped to a pulp is pressed and dried, and then ground to flour called cassava. The starch of the roots is known as the tapioca of commerce.

Teacher.—The manufacture of the manioc-flour and tapioca is one of the leading industries of the country. Much tapioca is now produced from the planted shrubs, so we cannot call this strictly an uncultivated product. Where is cinchona or Peruvian bark found, Bertha?

Bertha.—It is found in Peru. (Maps.)

Teacher.—Well, Helen?

Helen.—It is found, too, in Bolivia, Ecuador, and United States of Colombia.

Teacher.—In what plateau are all of these countries which produce this bar ?

Helen.—The plateau of the Andes.

Teacher.—In which half of the section, Charles?

Charles.—The northern half of the Andean plateau.

Teacher.—Of what use is this bark, Ella?

Ella.—It is used as medicine. Quinine is made from cinchona or Peruvian bark.

Teacher.—What other medicinal plant did Harry name, Helen?

Helen.—Sarsaparilla.

Teacher.—Where in South America does sarsaparilla grow?

Helen.—In Venezuela, United States of Colombia, Ecuador, and Peru. (Maps used.)

Teacher.—What kind of vegetable products are these which we have named?

Class.—Uncultivated.

Teacher.—These may all be included in the term *forest products.* Let us name them.

Class.—(Reading from the blackboard.)

Cabinet woods,
Dye woods,
Fruits of palms,
India-rubber,
Peruvian bark,
Sarsaparilla,
Brazil nuts,
Cassava, etc.

Teacher.—What other kind of vegetable products are there, Etta?

Etta.—Cultivated products.

Teacher.—Name the principal cultivated vegetable productions of South America?

Gracie.—Coffee, sugar, and cotton.

Harry.—Tobacco and indigo.

Lottie.—Bananas.

Teacher.—Spell that word, Lottie.

Children are required to give descriptions of the various products named. The words are written upon the board.

Teacher.—What must be the nature of the climate and soil in these places where coffee, sugar, and cotton grow, Edna?

Edna.—The climate must be warm and moist, and the soil rich.

Teacher.—What countries of South America have such conditions, Bertha?

Bertha.—Brazil, Guiana, and Venezuela, principally. (Maps.)

Teacher.—Then these products are found in what countries, Harry?

Harry.—They are all found in greatest abundance in Brazil, but Guiana produces large quantities of cotton and sugar, while Venezuela produces superior grades of sugar and coffee.

Teacher.—How does Brazil rank with other countries in the production of coffee, Ella?

Ella.—Brazil yields more than half of the coffee consumed in the world, and the United States takes fully one-half of the quantity exported.

Teacher.—In what zone does the indigo plant flourish, Mac?

Mac.—In the Torrid Zone.

Teacher.—We shall then find this plant in the northern part of South America, but in what countries, Etta?

Etta.—In Venezuela and Brazil.

Teacher.—Class may name the cultivated vegetable products.

Class.—(Reading from the blackboard.)

Coffee,
Sugar,
Cotton,
Tobacco,
Indigo,
Bananas,
Rice,
Cocoa, etc.

General Drill.—Pupils name, spell, describe, and point out on relief-maps the various localities in which the productions are found.

CHALK-MODELING AND MAP-DRAWING.

Map-drawing is now generally recognized as an important auxiliary in the study of geography; but many teachers make the mistake of regarding it as an *end*, and not as a *means*. Cartography, or the production of finished and mathematically accurate maps, is work for engineers and topographers, not for students in our public schools; and while we will yield to none in our appreciation of beautiful work of this kind, still it is believed that the acquisition of the habit of close observation, and the attainment of skill in representation are of far greater importance than the mere production of maps possessing artistic finish.

A gentleman once told us that one thing which struck him as

particularly noticeable in the school-life in Japan, was the power the little boys possessed of representing by a few rapidly-drawn lines the object to which they wished to direct attention. Drawing was with them a second language. Now it is psychologically true that drawing is a means of concept expression :—a language by means of which we may express sight impressions. It is in its practical application of this truth that the German method of teaching geography trends in the right direction. The rough diagram or sketch in which the German lad seeks to express his concept of the relative shape and outline of the Americas, may be crude indeed, yet the simple sketch fascinates us—interprets to us something which we may never have grasped before. How often the elaborate work, full of the most marvelous detail, only excites our wonder! It tells us nothing; it teaches nothing.

We are all inclined to flatter ourselves by imagining that we know more than we can express, but the truth is that we can only draw or represent so much of a thing as we can *see*, or in other words, so much as we can *realize*.

It follows from this, that we can expect little good from any system of map-drawing in which *tracing dim outlines* occupies any considerable part, if, at the same time, much original work be not done on such maps. The pupils should often be required to produce maps without the aid of either outline or construction lines. Even the production of what some one has sneeringly called "nondescripts" will go far to show to the teacher what actual concepts the children have of the form of the continent which they have been studying.

The early sketch-maps may be, probably will be, in their honest hardness of outline, far less pretty than those of more pretentious ignorance; but while those who have never learned the alphabet of the true art of map-making can make no progress, those who base their work upon a sound foundation will

find that every sketch-map they make is an education of hand and eye and brain.

Let any teacher study the plan which he will himself adopt

Fig. 63.

when tracing any outline, and then find whether he has by the process obtained any concept of the form of the whole. In nine cases out of ten it will be found that the effort to concentrate

the mind upon the detail focuses the eye upon a very limited portion of the outline, and prevents the retention of any concept of the entire form.

"Sketch the tree first as a whole," said a famous artist to his pupils, "do not try to grow a trunk onto the branches." How often children are required to work at the leaves and branches of continents before studying and drawing the trunk-forms!

With young pupils, the power to imitate should mainly be relied upon in the work. If it be possible, send them all to the blackboard, and have them *block in*, with the flat side of the crayon, the mass of the continent. But you say, "The work looks so rough, so crude." Yes, the first attempts may be poor; but improvement soon begins, and the end shows that the plan is a correct one. The difficulty here, as in all kinds of *real* work, lies in *the trouble of thinking*, to escape which we sometimes catch at the most laborious trifling, When the child looks at a form in order to draw it, there is a strong act of the will, and this causes true growth of the mind. This form of drawing or *chalk-modeling* is one of the most valuable aids in the teaching of geography. In the hands of skillful pupils and teachers it becomes a source of never-ending delight.

Modeling the continent in sand should precede the drawing of the form, and it would be well if the representation of the surface in color could also precede drawing. Where it is not practicable to employ water-colors in the representation of the continental masses, colored crayons may be used with good effect. From the modeled continent as formed upon the molding-board the continent as a mass should be drawn in green chalk; next the plateaus and mountains in brown or yellow; then the rivers in *bright* blue. When mountains occur upon the map, they should be drawn before the rivers, except in case the rivers form a part of the the boundary line. The mountains at once give the

direction in which the land slopes, and therefore show the courses in which the rivers flow. In drawing a river, the line should be drawn from the source to the mouth. A child will very soon understand that it is only reasonable to trace a river in the direction in which it really flows.

It is believed that with more advanced pupils the original development of the outlines of the continents by means of accurate construction lines may be made interesting, and the energy expended not be lost. The system is as old as the time of Ritter, and has the sanction of that great geographer. If the measurements be given in inches and the work done to scale, much skill of a practical value will be gained. Pupils take pride in making good maps, and it should be remembered that they take little delight where *learning* is not *doing*.

Cartography in its higher forms does not belong to our schoolrooms; still there is one use which may be made of any good system of construction lines, aside from their use for purposes of map-drawing: pupils in the higher classes may easily calculate the areas of the continents from such lines.

Besides the maps which are usually made in our schools, maps should be made showing the rain-belts, forest regions, deserts, plains, plateaus, staple products, races of men, density of population, religions, ancient empires, manufacturing interests, commercial lines of travel, sections visited by noted discoverers and explorers, territory after conquest, colonization, etc.

In many schools, especially in the rural districts, there are no opportunities for teaching the productions of a country as shown in the lessons on the Progressive Sand Map. In such cases a passable substitute may be made thus: Let an outline of the country to be studied be drawn upon a large sheet of manilla paper. The lines of the coast may be made most effective by shading in blue. Now paste upon the map the products of the

country in their proper localities. Wheat, oats, barley, rice, wool, cotton, iron-ore, gold and silver leaf, cabinet woods, coffee-beans, etc., may all be easily fastened to the paper with glue. If the pupils are asked to bring the various products, there will be no difficulty through lack of quantity. Such product-maps give freshness and variety even in schools where the molding-board is in daily use. The same method may be pursued in the production of *botanical* charts of a district, county, or state.

The following method, suggested by a correspondent for one of our educational papers, gives a splendid opportunity for drill upon map-sketching as well as a good change from routine work for both teachers and pupils.

Let one of the pupils be sent to the board to draw an outline map of a country, and let the others at their seats draw upon slates or upon paper.

Allow fifteen or twenty minutes for the drawing of the map, and as many more for the study of the same.

Now let one of the pupils stand at the board and question the class upon the various features of the country, making use meanwhile of the map drawn. When one pupil has exhausted his stock of ready questions, let other members of the class continue the questioning.

The teacher must see that the pupils bring out the leading features by their questions, and should supply any omitted points.

The method is of great value, since pupils are led to independent study. Never were words more true than these of Rousseau: "If your head always directs your pupil's hands, his own head will become useless to him."

ILLUSTRATIVE SKETCHING.

Teachers will find that their work in the class-room will be rendered more effective if they will cultivate a taste for light sketching, in order that they may thereby acquire the power to illustrate their work at any moment. If we study a picture carefully, we shall find that the principal points are all brought out by a few strong lines. Teachers should strive to gain that power of the eye which will enable them to seize upon these main points of a picture, and then by constant practice acquire that control of hand which will enable them to represent the thing desired.

Some teachers may think that this is a sort of Egyptian tyranny, to bid them make bricks, having not yet any of the materials. But let us look at the matter. Have we not failed in duty in denying the soul some of its possibilities of development by neglecting to train the sense of sight? We do not cultivate this sense, which is by no means naturally strong with the English race. Through our belief that we can do nothing in this line, we have come to the conclusion that we are thereby relieved of all responsibility for the cultivation and the training of the hand and eye in others.

Elementary training in sketch-drawing should be a part of the course in every school in which teachers are prepared for their work. The line of work should be specially directed towards the attainment of genuine control of the hand. The direction of the classes in sketching should be placed in the hands of persons possessing artistic skill.

But those teachers who have had no chances to obtain good training may do much to improve themselves in this respect, if they will but think so, and try. Make a bold stroke to emancipate yourselves from the slavery of the belief that you can do

nothing. At first your attempts will be crude and poor—very poor, perhaps—but the next time that you try you will do better. Soon you will begin to take pride in your work, and the ready interest excited in the children will be your stimulus. Never mind if occasionally they do become your critics, and mistake your horse for a cow, or the cat for a sheep. Perhaps you will find that the fault may lie in the fact that you have not sufficiently emphasized the characteristic points of the animal; and this, because your own percepts and concepts may not be so clear as you may have supposed.

A very common fault with beginners, and one which it will be well to guard against carefully, is *false finish*—labor thrown away by the employment of methods which take more time than other methods, while, at the same time, the result may be much inferior. For example, fine lines and cross-hatching should not be employed in shading in cases where chalk, charcoal, or the stump will give a shade of better quality in less time.

Economy in labor, wherever it is not artistically an evil, should be observed. Get a few sketches by good artists, and notice how in their work these men give rapidity of execution, not by hurrying the hand, but by adopting the most summary means of expression. The natural world presents itself to the eye as a series of patches or spaces full of gradations of light and shade and color, but having no real lines.

Not that the teacher will not find it useful at times to use that purity and firmness of outline which is a characteristic of the best Greek art, while at the same time it is the style which a child naturally adopts in his own first efforts; but in making sketches, in general, the teacher should aim to see and represent the large masses of light and shade, and thus to convey impressions and ideas rapidly and accurately.

FIG. 64.—THE GEYSER.

MAP MODELING IN HISTORY.

Map modeling in connection with the work in history has considerable educational value, since everything that tends to make clear the geographical relation between various nations will aid in the understanding of their history. The most natural association is that of time and place, and all the points that tend to fix the place in memory will tend to impress the time relation in a corresponding degree. The imagination is of course the faculty to which the strongest appeals must be made; but as we model the coast-line of Greece in our study of the history of that country, we shall find that the peculiar charm of an intimate blending of land and sea could not fail to make navigators of the Greeks. It incited them to active commercial intercourse with other nations. The connection between the physical character of a country and the history of its people is most intimate.

As we take up the individual events of history, an accurate knowledge and expression of the physical features becomes a very important part in the thorough study of causes and effects. No teacher who has ever used the molding-board in the course of a lesson in history will ever return to that senseless memorizing and repeating of meaningless words so long forming the bulk of this work in our common schools.

Take, for example, the early history of the Western part of Pennsylvania. The long parallel ridges of the Alleghanies seemed, like huge fences, to confine the English people to the country east of the mountains. The pasture of the eastern slopes of the mountains was not, however, to be the limit. In 1754 the governor of Virginia sent Washington to take possession of the

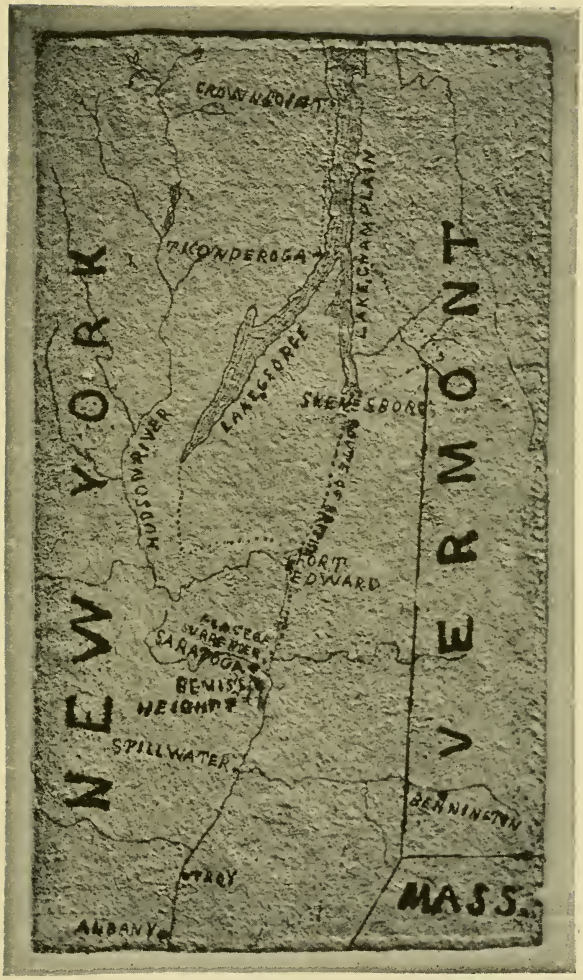


FIG. 65.

PAPIER-MACHE MAP OF BURGOYNE'S INVASION.

country, and the young major selected a spot where the Alleghany and Monongahela rivers unite to form the Ohio. As the teacher molds these valleys meeting at the point at which the great city of Pittsburgh now is found, the power of its position will be seen more clearly. Fort Duquesne was the seal that the French placed to confirm the wisdom of Washington.

In the study of the various battlefields mentioned in the history of our country the teacher may use the molding-board with excellent effect. Bunker Hill, Saratoga, and many others are examples of those that are best adapted to such representation. The whole campaign of Burgoyne's invasion is the subject of the papier-maché map, Fig. 65, modeled by Wood Bishop of the public schools of Wilmerding, Pa. Fig. 66 shows the further application of the same idea, although it is impossible to reproduce in the photograph the colored inks used in the marking of the various details of the map.

The great battlefield of Gettysburg may be modeled and the advantage of the selection of the terrible fishhook "position" of Cemetery Hill be made plain. During Wednesday night and Thursday morning the two armies were concentrating on the two ridges which were to be the line of battle. Then began the great artillery contest. The cannonade was fierce and incessant, and many shells were thrown into the town. Both sides fought with great bravery, but neither could drive the other out of position. On Friday morning General Lee did not desire to make the attack. He saw the superiority of the federal position, and tried to entice the Union troops out of it and down into the valley. The confederates marched out of Gettysburg and retired to the seminary, but gained nothing by the movement. All day the battle raged with great fierceness in charge and countercharge. At last about four o'clock occurred the sanguinary struggle that Whitelaw Reid has called the *great final charge*. In this great

onward rush the *High-water Mark* of the rebellion was reached. Pickett's division lost six-sevenths of its officers and men; while the federals under Gibbon, their strength diminished one-half, still held the crest. The confederates gathered up their broken fragments, formed lines, and slowly marched away. It was not a rout, but a bitter, crushing defeat. Fig. 66*a*.

Although no model can take the place of the idealizing forces of a vivid imagination, there can be no doubt of the value of the representation of the relief forms in this relation. Lookout Mountain, Missionary Ridge, and the Shenandoah Valley—that "Valley of Death"—may become more than mere names if their relief forms are properly understood.

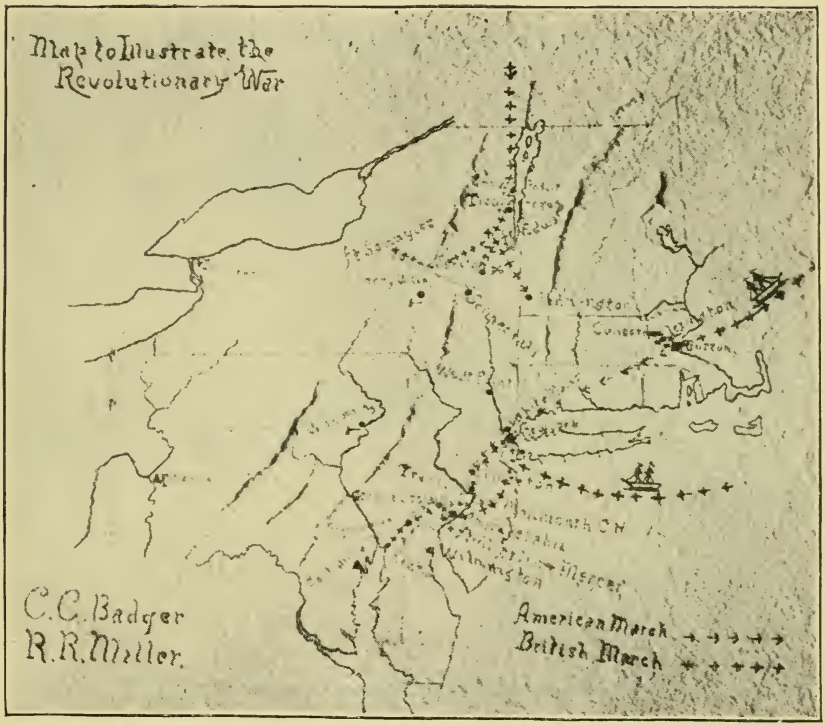

Map to Illustrate the
Revolutionary War
C.C. Badger
R.R. Miller.
American March
British March

FIG. 66.

Lessons in Home Geography.

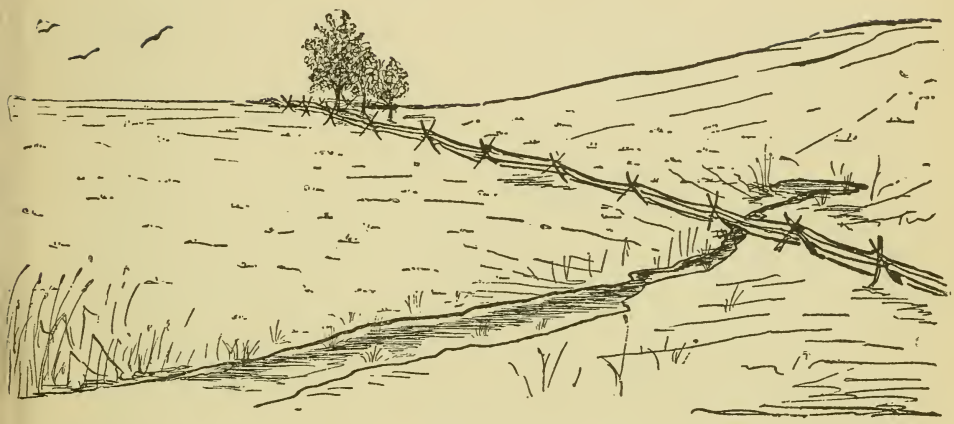


Fig. 67.

Lesson I.

The Spring in the Pasture.

These lessons in Home Geography are taken from "Home, Relief, and Life," a series of geographical studies copyrighted by the author in 1892. They are here inserted in order to suggest lines of similar work to teachers who may use the preceding lessons in map modeling. All work of this kind must have its own local coloring, and can be useful in transcription only as it is made the means whereby the teacher makes the brooks and mountains speak to the children.

Guyot says that in teaching geography the child must first be

made acquainted with nature as it exists under conditions of surface, climate, and culture; he must know the thing to be symbolized, before the symbol can have any definite value. Oral lessons on the home neighborhood must be given, that the children may become conscious that they possess knowledge acquired through their own powers of observation, and may use these concepts, obtained from the geography of their own locality, in building up images of more remote regions. A child has taken his first steps in geographical study when he has made a careful study of a small portion of the earth's surface, and has made a map of the school-ground.

In giving such primary notions of this great study, which Ritter calls "a great school of culture for the human race," the teachers in our country schools possess natural advantage over those less fortunately located in cities. Still, there are many objects accessible in the least varied neighborhood, and these may be made the basis for future ideas of rivers, lakes, plains, and mountains.

A child's penetration is keener, and his judgment fairer, than most teachers imagine. Although his knowledge is limited, he may be led to make inquiry into much that is useful if he but come under the instruction of the skillful teacher. I would have every teacher draw; if but the rudest sketches, *draw*. The lesson may be given thus:

I saw Jennie coming through the pasture on her way to school. What is a pasture, Johnny?

"A place where sheep, or horses, or cows stay." Yes, but why do we keep them in the pasture? "To eat the grass." But do the animals need anything besides grass? "They want water, too." Where can they find that, James? "There is a brook in our pasture." (Hands rise.) Carrie. "There is a big spring in our pasture, and the water comes right out of the hill."

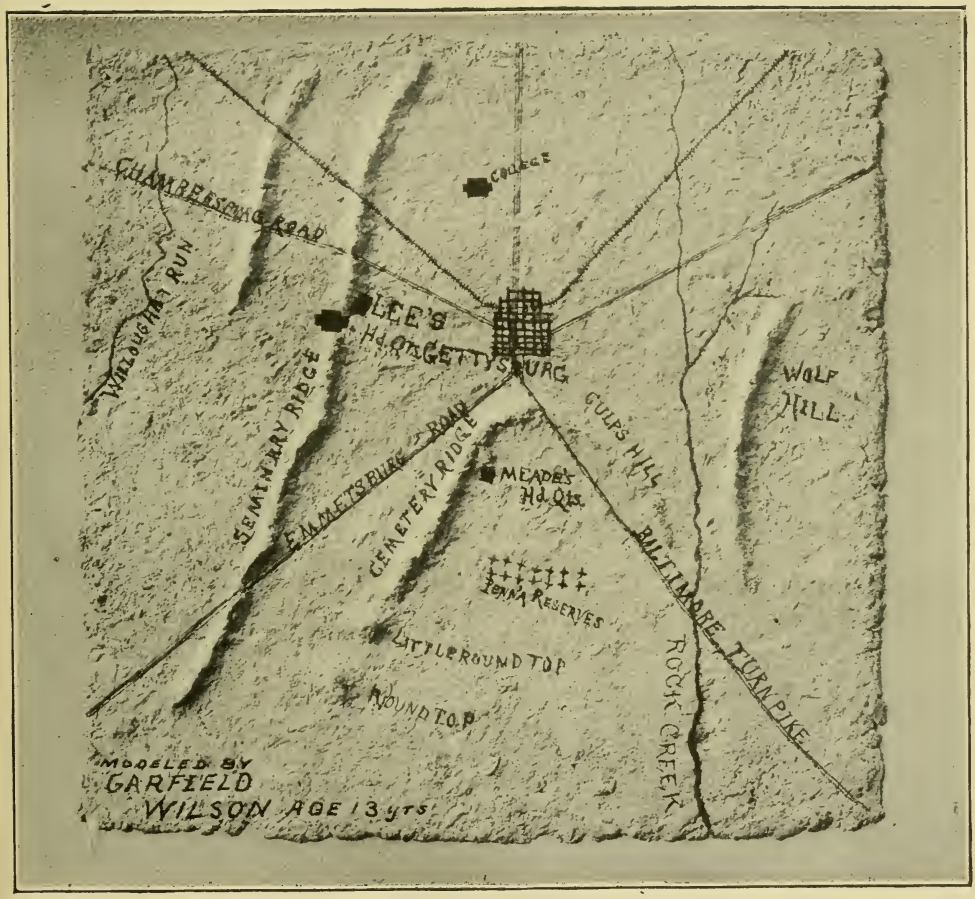


FIG. 66A.—MAP OF BATTLE OF GETTYSBURG.

What is a spring, Carrie? "A place where the water comes out of the ground." "A brook flows from our spring." And James says there is a brook in his father's pasture. "That's the very same brook."

How does a brook differ from a spring? "A brook is water flowing through the fields, and a spring is water coming out of the ground." That is good. Now, children, let us make a little picture of the spring and the brook. Right here at the bottom of the hilly ground, just as Carrie says, the water comes out of the hill. Do you see the spring? (Sketches rapidly; Fig. 67.) Here the land slopes down to the spring. Henry, did you ever see a spring? "Yes, and it was a big one with mosses and ferns and tall grass near it." Good. See the grass and the ferns. It is near the fence. So the same water goes into Jimmy's pasture. How the plants love the water! Some of them seem to run right into the brook. Yes, Johnny, "the plants need water as much as the cows do." The grass could not grow if the water did not come. "From the clouds." "Comes down as rain." Yes. Then it soaks through the ground and comes out at the foot of the hill. How funny, that hills should have feet. "Where they stand on the level ground, of course."

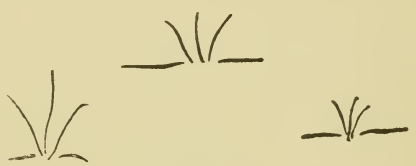


Fig. 68.

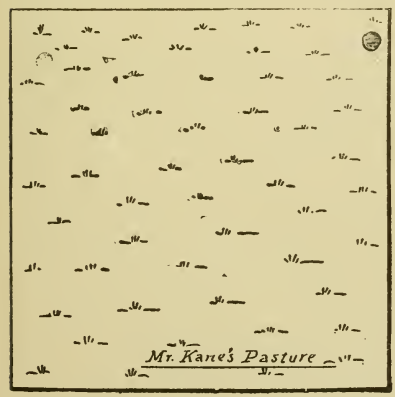


Fig. 69.

See where the land slopes down to the spring. (Draws

lines for the slopes.) "Yes, it slopes toward the brook on each side." (Draws slopes.) How many slopes in the little brook's cradle? "Three." "If there were four it couldn't get out of its bed." Yes, that is what we call it, the brook's *bed.* But the brook does not get out of its bed, for the larger the brook grows the larger its bed becomes. Yes, James is right. "It runs into the big creek that makes the mill-pond for his father's mill." "That is Wolf Creek." So the Indians called it, because there were many wolves there before the white men came. Can you name another creek? "Muddy Creek." "Slippery Rock Creek." This last one is long and deep. But how does Wolf Creek make the mill-pond? "Some men built a dam right across the creek, so the water was stopped, and it filled up behind the dam until the water became very wide and deep, and then ran over the dam." That is told very well. Let us draw the pond. (Draws.)

Some day we shall learn of something that is much like a pond, only larger; but nobody ever built a dam to make it.

"That's a *lake*" (says Johnny).

You may draw the pasture, the spring, and the brook. Make the little bunches of grass like this (Fig. 68). (Give this as *busy work.*)

From the crude pictures drawn by the children there is but a step to the conventional map (Fig. 69), by which the surveyor conveys the idea of pasture land. Have the children draw such squares and oblongs.

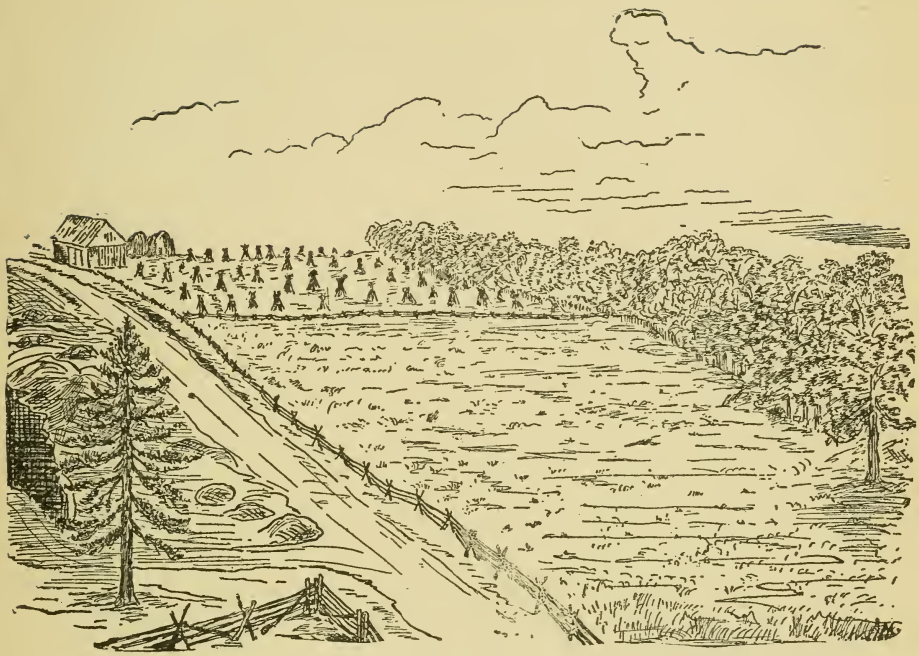


FIG. 70.

Lesson XX.

FORMS OF LAND.

On her way to school Jennie came through the pasture. As she opened the large gate I saw her drive back the cows that tried to run out into the road. Mr. Smith put the cows in there to eat the grass, Freddy says. "It is not very good now, and I guess they were going up to the barn because the weather is cold." You little Yankee, to "guess." What did they want at the barn? "I think they wanted some hay, Miss Clay." Mary

says that in the meadow, across the road from the pasture (Fig. 70), the cattle were not allowed to eat the grass as fast as it grew. "When it was very tall, father mowed the grass and made hay." What did he use for mowing the grass, Kate? "A mowing-machine, perhaps; father used one in his meadow." "So flat that the horses could draw the machine anywhere." "No stones."

When you look over the pasture and meadow can you see other differences? "The pasture is rough and hilly." "It has briars and bushes, but the meadow has none." What are hills? "Where the land rises up." "Where the land is higher than the rest." The sides of the hills we call slopes. "Smith's hill has a very gentle slope." James says it is not so on all sides. "Where the road leads into the quarry." "Where stone is taken out for the walls of buildings." "One of Uncle Frank's sheep fell over those rocks last week." Well, Kate? "It goes straight down." Let us call the place where it goes straight down a sharp slope, or an abrupt slope. "Uncle Frank said that the sheep fell over the—" Did he say it fell over the *precipice?* "Yes, Miss Clay; that's what he said. It fell over the precipice, and the hill is very steep there." Carrie? "After Mr. Smith had cut the grass in his meadow, some of the hay was put into the barn, and the rest was piled up back of it." "The sheep were turned into the meadow to eat the new grass." Why did not your uncle put the sheep into the lower lot, James? "He said it was too wet. Sometimes, when I go down there after the cows, I send Rover to drive them out of the swampy part. Grandpa says that when he came to the farm, all the land which is now meadow was swampy." How did it change so much? "He dug ditches to run the water off." Well, Charlie? "Father uses *tiles* when he drains land." "But he must put them under the ground."

Yes, that is so. When there is too much water it must be

drained off into a brook or other stream if we wish to raise good crops on the land. "Some land is too rough and stony to be plowed, and is only fit for pasture." What did Mr. Smith plant near the barn? "Corn and potatoes." "In the field are many big pumpkins." "Orange-yellow." "The corn was cut a week ago." What do we call the piles of cornstalks as they are set up in the fields? "We call them shocks." Soon the corn will be husked, and the bright ears taken to the corn-crib. "Meal is made from the corn." "Father feeds corn to the pigs."

We have named so many kinds of land that we should write out a list of them:

Meadows, *Marshes,*

Pastures, *Quarries,*

Hills, *Cornfields,*

Swamps. *Woodlands.*

You may copy these words when you go to your seats. Yes, George, "there is one kind we have not written yet," *woodlands*, and I will put that at the last. You may write under it all the new kinds you can remember. Do not name any more now. (Busy work.)

Let me see your picture-maps of the pasture, the spring, and the brook. Some have put in the fence, the trees, and the hill. Ruth has drawn grass and rushes (Fig. 71). We shall soon learn to make good maps.

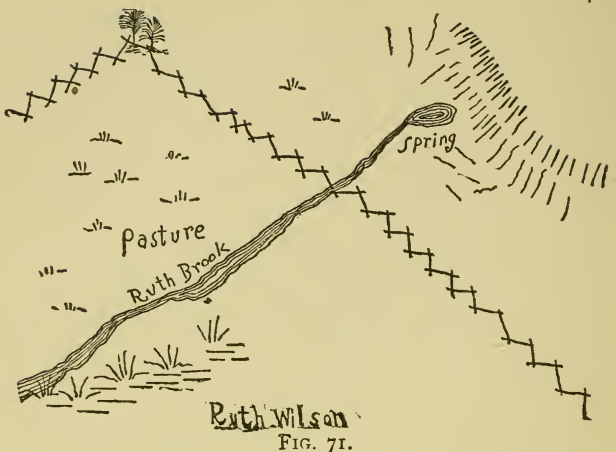


FIG. 71.

(Made by a child about eight years old. The sketch is not perfect by any means, but shows a child's natural tendency to conventionalize drawing into set maps. Notice the manner in which she represents slopes.)

FIG. 72.

Uncle Frank's poor old sheep fell over the precipice. Our little brook runs out of the pasture too, joins the big creek, and falls over a precipice. "That's the falls" (Fig. 72). "Tom and I were down there fishing last Saturday." "What do we call it? "A waterfall." Some people call large waterfalls *cataracts*.

Here is our list of words for the waters. Mary may name one, and then write the word neatly upon the blackboard.

Spring, *Creek,*

Brook, *Milldam,*

Stream, *Lake.*

Waterfall or Cataract.

Lesson XIX.

Products.

The teacher examines the papers, slates, or books upon which the children have written the names of the kinds of land. Some children have added new words at this place, orchards, coal-lands, clay-beds, oil-lands. These are added to the blackboard lists, and give basis for future study. Let these names come from the children. Some of those given above would be the last mentioned by the children in other localities.

What a large number of useful things we have growing upon the land! The meadows give us grass from which we make hay, and in the ploughed fields we may plant grain and other things. Kate may name some of the common crops. "Wheat, oats, rye, and barley." James? "Corn and buckwheat." "We feed the corn to the hogs." "No, not all of it, for the miller makes meal from corn." And the buckwheat? "Oh, that is made into flour for buckwheat cakes!" Jennie may tell about the crops. "We have pumpkin pies down at grandma's house; that's the way grandma uses the pumpkins." A very good way. "Some farmers feed them to the stock." (Fig. 73.) Grandma says that her mother made syrup by boiling pieces of pumpkin in water." "During the war for independence." "They couldn't get sugar. Sugar makes the pumpkin sweet." "Ben and I made a jack-lantern last night." (Fig. 74.) (The despised jack-o-lantern, thus forcibly thrown into the lesson, need not necessarily

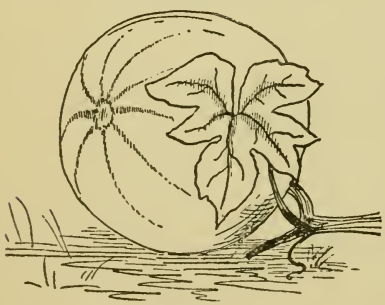


Fig. 73.

be rejected. In the hands of a skillful teacher it fairly beams with light in regard to meridians, parallels of latitude, poles, zones, triangular and four-sided continents, islands, etc. Pass it by for the present, however, until the boy can bring it as an objective reality into the schoolroom. It may then be made something more than a source of laughter.) But we want something about other crops, Harry. "Mr. Smith paid me for helping Tom and Paul pick up the potatoes as the men dug them out of the potato hills." "Yes, Miss Clay, Harry did help me, and we filled great bins in the cellar, and piled up a great many potatoes outside, and just covered the whole heap with straw and earth. Father said that the potatoes will not freeze, even if the winter should be quite severe." Were all the bins filled with potatoes? "We picked the apples in the orchard, and put many bushels of winter apples into dry bins above the cellar floors." "Father sent all of his apples to market," says Jennie. "He packed them in barrels."

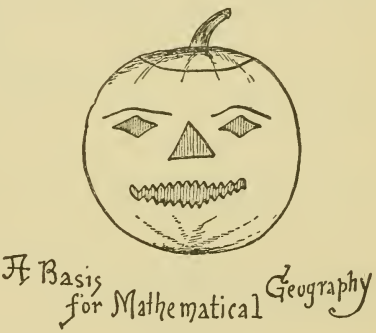


FIG. 74.

"About two and one half or three bushels in each barrel." "Baldwins and greenings, russets and gilliflowers." Well, Elizabeth? "Uncle John sent grapes to the city market." "And plums and pears." "In baskets." "We nailed the covers down." "We sold all the peaches at home."

You have told me about the products of the fields. Let us make up our list on the blackboard. Here is the heading. Kate may write the names of two products; then Harry, May, Elizabeth, Jennie, etc.

WHAT THE FIELDS PRODUCE.

Hay,
Wheat,
Corn,
Oats,
Rye,
Barley
Buckwheat,
Pumpkins,
Potatoes,
Grapes,
Apples,
Peaches,
Pears,
Plums.

Orchard fruits.

(Others, such as beets, turnips, cherries, added by the children when the lists are copied.)

Now that we have made the list of the products of the fields and orchards, let us tell what the woodlands give us. Paul may tell. "Logs to saw into lumber." "Ties for railroad tracks." "Father cuts rails for the fences," says Ben. Good. Carl may tell about the woodlands, too. "Mr. Morrison had the large oaks and maples cut into barrel-staves." "A steam-mill which they could move along the road."

We call that a portable mill. "Mr. Covert uses oak-bark in his tannery." "We cut rails and bean-poles down in the young

FIG. 75.
The fish-poles and the clay banks.

growth." Yes, you sly little fisherman, Tom,—"fish-poles." "We gather chestnuts, hickorynuts, and butternuts." Here is our list:

WHAT THE WOODLANDS GIVE US.

Railroad Ties, Lumber, Staves for barrels, Nuts, Tan Bark, Fish-poles, Rails for fences, Bean-poles. (Fuel.)

We did forget the "firewood," Jennie. Write the word *fuel* upon the blackboard.

"But *we* use coal." "We dig it in the *coal-out*." That is a small coal mine. We shall study about the things that are found underground, but no more to-day. Draw the pumpkins on your slates.

Lesson XV.

Occupations.

Let us put more coal in the grate this morning, for the cold winds are blowing outside and winter is coming. We have had our Thanksgiving holiday, and have come back to our studies, until Christmas day. "Miss Clay told us about the first Thanksgiving." "The winter was very cold, and the Puritans did not have much to eat." "When spring came they planted corn, oats, beans, and ever so many other things, so that they would be sure to have enough to eat during the next winter." "The harvest was good, because the men tended the crops carefully all that summer, and in the fall there was plenty to put into the cellars and log barns which the Puritans had made." I am glad that you know the history so well. How thankful we should all be that God provides so plenteously for us in this beautiful land of ours.

The old Puritan governor sent four men out hunting, that the people "might after a more special manner rejoice together." "Did they find some wild turkeys?" Perhaps, for this is the home of the turkey. "We do not send men out to hunt for turkeys now." "Father has ever so many turkeys which he is keeping until Christmas." He will sell some to the huskster who will take them to the city." "The huckster takes the feathers off or dresses the turkey before he sells it." "But he sells some alive." Yes, that is true.

How many things we have for Christmas dinner! "Apples," "pears," "grapes," "mince-pies, and sometimes pumpkin-pies." "Nuts and candies." Yes, all these and the more substantial foods, too. "Potatoes." "Father has a whole *barnful* of pota-

toes." A barn full of potatoes, Harry! "Well, perhaps, not so many as that, but the men are filling a great many barrels and sending them to the city." "Farmers raise almost everything."

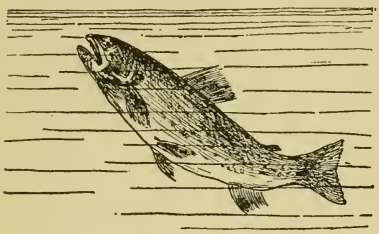


Fig. 76.

What do you expect to have as a Christmas present? "A sled." "Some toys." Do you know where most toys are made? The people who live in the country called Germany carve many toys. Some of the peasants who live near the Black Forest become very skillful in the work. All the members of a family will learn to carve the same kind of toy. "Sheep?" Yes; the grandfather will learn to make wooden sheep, and then all the other members of the family carve sheep. "Wooden dogs, camels, horses, and lions." "Those are all in my *Noah's Ark*." Even the very small children learn to carve the soft wood very skillfully with their sharp jack-knives.

"Mother will buy me some nice shoes." "The shoemaker." And Harry said something about a sled, I think. "The blacksmith makes the shoes for the sled-runners." "Father bought *my* sled at the store." "Mother says when I grow up she will buy me a fishing-rod like the one cousin Albert used when he caught the big trout," says Tom. "He caught it just below the falls." "Big enough for a whole dinner, almost."

How many different things men do for a living! Here is our list on the blackboard:

WHAT MEN DO.

Some raise corn, wheat, and other foods..... Farmers.
Others dig coal and iron from the ground. ... .Miners.

Some dig stones from the quarries..... .....Quarrymen.

Others make things..... { Shoemakers. Tailors. Blacksmiths. Carpenters. Toy makers.

Some buy and sell or "keep a store"... ..... { Merchants. Hucksters.

Some other men are..... (Fishermen.)

Here are some words which show what men are doing:

Farming,

Mining,

Manufacturing,

Commerce or Trading.

What are some other men doing? Tom insists that we must put down "Fishermen." Write the list that we have made, and think of some others. (The *perspective* which the children will give to these various callings will be as varied as the homes from which your pupils come.)

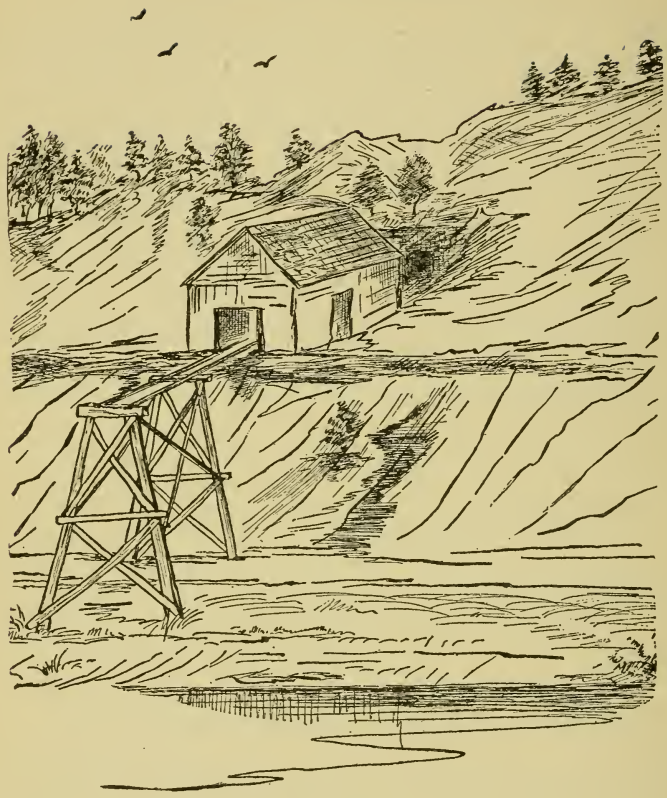


Fig. 77.

Lesson V.

Underground Products.

The farmers by taking care of their farms give food to mankind. What is the word that tells what these men are doing? "Farming." And now you may give some words showing what other men are doing. "Mining, manufacturing, trading." Do

you remember some of the forms of land and water? (Children name forms.) James says, "The whole earth is made up of land, water, *and the* fullness thereof." (This answer is just as the little

FIG. 78.

boy gave it, and his manner showed that it meant considerable to him. See Psalm 24. 1. It is this "fullness thereof" that so many teachers neglect in their geography work.)

Yes; the things we find in the water and in the ground are very important. What is this? "A lump of coal." "It came from the *coal-bank*." "That is what some people call a small coal mine." "It is in the side of a hill." Let us make the sketch of one. Here is the tool-house, and here the track, and the coal-dump. "The cars and mules are in the mine." (Luckily for the inartistic teacher.) (Fig. 77.) "The mine is dark." "Father digs

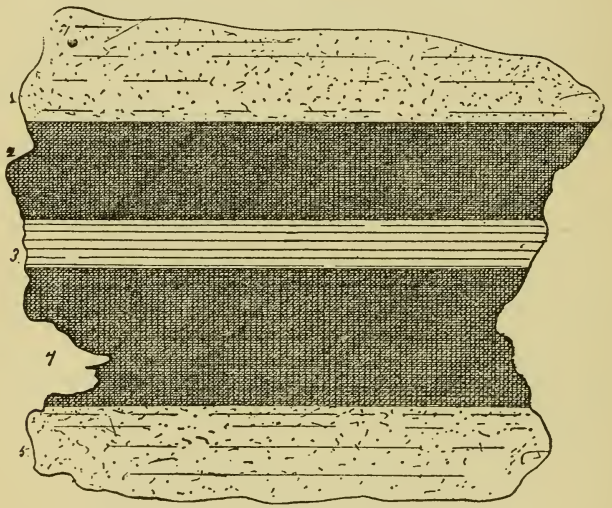


FIG. 79.

1. Horseback. 2. Upper Layer. 3. Slate. 4. Lower Layer. 5. Clay.

coal." "The miners wear lamps on their hats." How is the coal taken out? "The men dig it out with *picks*." (Fig. 78.) "Father says that the coal in our coal-bank lies in two thick layers." "Level like a table." "Horizontal layers." Let us draw these layers of coal. "Our coal rests on shale and clay." Here is the layer of clay and shale. "A thick layer of coal." "Then a layer of black stone." We call that shale, but in some

mines the layer is of slate. "Now comes another layer of coal, and then a layer of hard stone to make the roof of the mine.' "Father calls that the '*horseback*.'" It is sandstone in many cases. George has been in the mines. Men put in timbers to support the roof-stone. The passages are sometimes called galleries, especially when one is above the others. (Fig. 79.)

How useful the coal is! "It gives us heat." "To burn in stoves and grates." "To make the engines go." "The locomotives, and engines in the mills." Can you name any other uses? "Coke is made from coal." "They use coke in changing iron into steel." The gas for lighting the streets of cities is made from coal. "But we have gas-wells here." "Natural gas." "It came from the coal, too." "Most people use coal-oil to light their houses." Do you know another name for that? "Petroleum." These all come from the coal, men say, and there are many other coal-products. "Coal-tar." Yes, and some very beautiful dyes are made from petroleum.

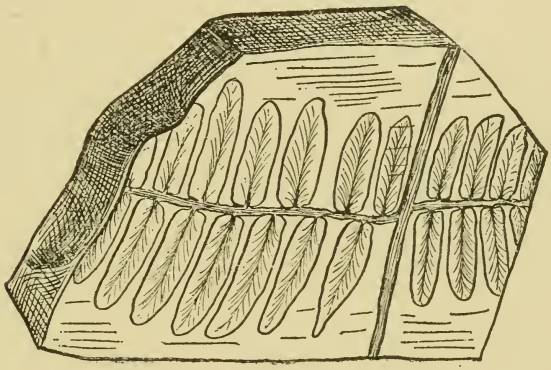


FIG. 80.

WHAT WILLIE BROUGHT NEXT DAY.

(Technically the *Neuropteris*, one of the most abundant fossil ferns.)

Do you know what is made from the clay that is under the coal? "Mr. Hammond, my uncle, makes fire-brick from the clay." "In Westmoreland county." "At Bolivar." "To line the inside of stoves and furnaces." That protects the iron.

Willie says, "I found some prints of leaves on a piece of coal." "Limbs and bark." These belong to plants. Did the coal come from plants? "We think it did." How much it has been changed! Willie may bring the leaf-coal into class to-morrow. "Ferns." These were much larger than those which grow in our swamps.

How many in class have ever seen any other kind of coal? None. Here is a piece of coal, found in the eastern part of our state. Compare it with that which is found here. "It is harder." "It does not break into layers." "That is bright all over." There are two kinds of coal.

Soft Coal *(Bituminous.)*

Hard Coal *(Anthracite.)*

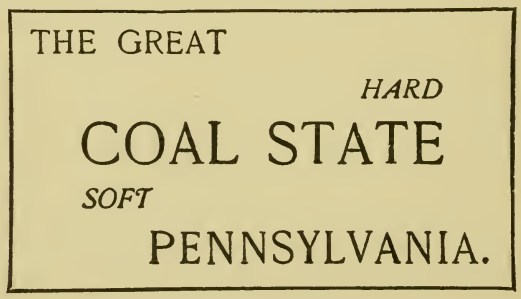


FIG. 81.
(FIRST MAP OF STATE.)

A State,—Pennsylvania.
A County,—Westmoreland.
A County,—Butler.
A Village,—Slippery Rock.
A Village,—Bolivar.

The coal-products are:

HARD COAL,	GAS, { NATURAL, MANUFACTURED.
SOFT COAL,	
COKE,	COAL-TAR,
PETROLEUM,	DYES.

(From the underlying clay, Fire-brick.)

(The writer includes in this lesson some things which are generally regarded as anything but elemental; still to little children who may see these sights in our state, a row of flaming coke-ovens a mile long, or the volcanic outbursts of great steel works, are nothing unusual. "Do Ye Nexte Thinge" is inscribed upon the walls of the great school at Eton.)

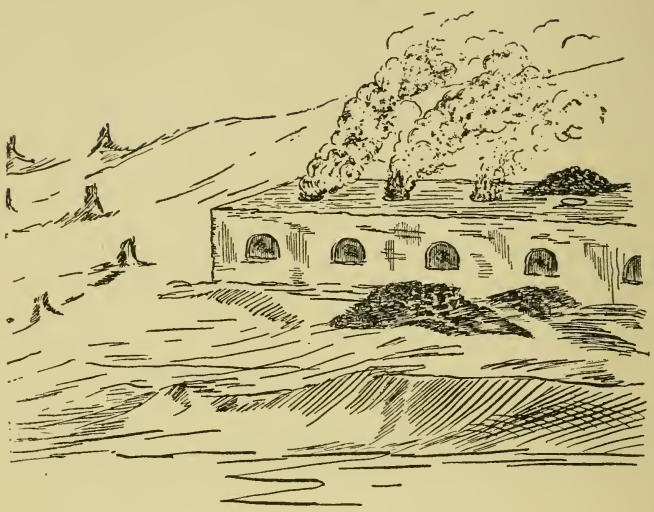


FIG. 82.

Lesson VI.

MANUFACTURING.

Many persons are engaged in *farming* and *mining*, and now we should learn something about what other men do to support themselves and their families. In our last lesson we learned something about the men who dig the coal. "They are called miners." "George's father is a *miner*." The men who load the coal are called *helpers* or simply *laborers*. "Mules are used in hauling the coal along the gangway." "Not all of the roof is called *horseback*." No, only that part which bulges into the coal and sometimes cuts off the layer. Name the common *coal-products*. (Review of previous work.)

Tommy speaks of COKE. "It is made just by burning coal."

"It isn't burnt up to ashes, but heated in large stone ovens." Men call that *roasting* the coal. Only the soft black bituminous coal is used. "It is called *coking coal*, because it forms coke." This is the most important of the bituminous coals, and the coke is used as fuel in MAKING pig-iron and steel. "When the coal is put into the ovens it swells, and melts or runs together into large pieces." "Water is then thrown in to quench the coke, which is then raked out of the ovens." "We use 'bee-hive' ovens." Do you know why they are called by that name? "Like bee-hives." "Not much like the bee-hives which my father has for his bees." "Like the bee-hives which we see in pictures." I saw the men building one of the ovens, and they used wooden frames shaped like parts of a huge orange. Over these the men built an arched wall of fire-brick for the inside lining of the oven. The ovens are built in long rows (Fig. 82), near the mines. In the Connellsville coke region there are nearly twenty thousand ovens. Coke is sent to all parts of the country. It is used in the melting of silver and gold as well as in the melting of iron. Thousands of men get their living by making coke from the coal which the miners dig in the mines. What do some other men do?

"Mr. Brown makes lumber at his saw-mill." "He buys logs, and saws them into lumber." "*A sawyer.*"

"Mr. Sampson makes boots and shoes." "*A shoemaker.*"

"My father has a grist-mill, and grinds the wheat and corn to make flour and meal." "We call the men who make flour, *millers.*"

The men who made the fire-brick were *brick-makers*, and the men who laid the stone and brick in building the coke ovens were *masons*. These men work at their own TRADES. Can you name some other trades? "The *carpenter.*" "He builds and repairs houses." "The *tailor*, who makes clothes." The *harness-maker*, *blacksmith*, *cooper*, *cabinet-maker*, and *carriage-*

maker." "They earn their living by *making things* and selling them to other men." We shall say that most of them live by

Manufacturing.

Here is our list of men who work at trades:

Brick-makers,	Millers,	Blacksmiths,
Coke-makers,	Carpenters,	Carriage-makers,
Masons,	Tailors,	Coopers,
Sawyers,	Saddlers,	Cabinet-makers.

Write the names for some trades in which the men do not make or manufacture things. (Idea of a profession to be developed from this afterwards.) (Painters, etc.)

Some kinds of manufacturing require that a great number of men be employed together in order that the best results be reached. Large sums of money are needed in the building of the works, so some men who have CAPITAL form

Manufacturing Co's.

and are commonly known as

Manufacturers.

The men who are engaged in the manufacture of coke form companies which also work mines of coal. One of these is the Union Coal and Coke Co., of Greenville, Pa., which works the mines nearest to us. (Keister.) The great steel works at Braddock, Pa., are operated by a great company that is engaged in

the manufacture of steel, and also of the coke used in the process. Our nearest city, Pittsburg, is noted for its manufactures, and is often called the IRON CITY. Large quantities of steel rails are made. (Teacher draws map upon board.) Here is the Iron City. We will make this small circle to mark the place upon the rivers. Here is Philadelphia; here Harrisburg; and this is Altoona among the mountains. What is made in Philadelphia?

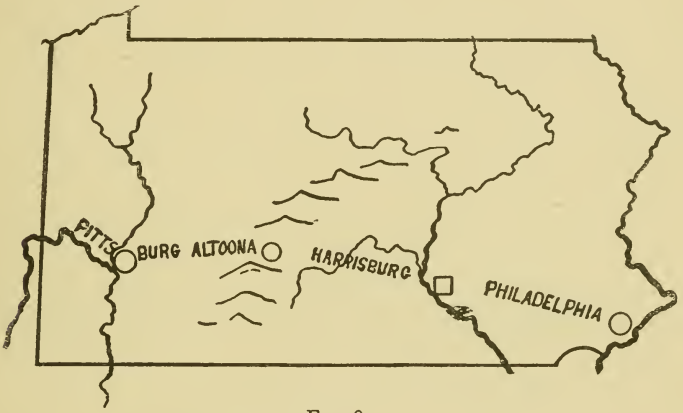


FIG. 83.

"Saws are made there." "The saws in our sloyd-room are marked 'Henry Disston & Sons, Philadelphia.'" "At Altoona locomotives are made." "At Harrisburg there are large foundries and machine-shops." "Mr. Black was elected to go to Harrisburg *to make laws*." That is a different kind of manufacturing, most people think. Draw the maps upon paper or upon your slates. (Fig. 83.) How shall we bring the saws from Philadelphia to Pittsburg?

Lesson VII.

Bird Trades.

The swallow is a mason,
And underneath the eaves
He builds a nest, and plasters it
With mud and hay and leaves.

Of all the weavers that I know,
The oriole is the best;
High on the branches of the tree
She hangs her cozy nest.

The woodpecker is hard at work—
A carpenter is he—
And you may hear him hammering
His nest high up a tree.

Some little birds are miners;
Some build upon the ground;
And busy little tailors, too,
Among the birds are found.—*Ex.*

This little poem, written on a square of cardboard, is handed to some member of the class.

John may read the selection about the birds.

(John reads.) Even the birds have trades. A great emperor of Russia learned the trade of shipbuilding, that he might know when his ships were properly built. We should honor all men who work at trades. Let us name some of the trades. (Review.)

Here we may study what the cooper does at his trade:

THE COOPER.

1. What he makes. ..... { barrels, hogsheads; tubs; pails; kegs; casks }

2. His tools..... { adz; plane; drawing-knife; mallet; chisel }

3. Materials used..... { Kinds of wood { oak; beech; fir }; hoops { wooden; iron }; staves; heads }

4. Making the barrels, etc. { Placing staves. Driving on the hoops. Putting in heads }

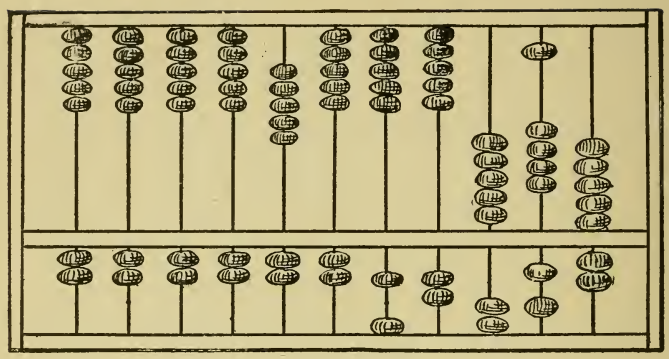


FIG. 84.

Lesson VIII.

BUYING AND SELLING.

Some men do not earn all of their money by their trades alone. What does Mr. Coulter do? "He makes tin-ware and sells it, but he buys stoves in the city and sells to the farmers and village people."

Mr. Bingham keeps a *hardware* store. He sells axes, saws, and tools of all sorts used by carpenters, masons, miners, and others. "The farmers buy their plows, harrows, hay-rakes, and other farm implements at his store." "Mowing-machines," "Seed-drills."

Mr. Kerr sells *groceries*. "Sugar, tea, coffee, flour, butter, lard, spices, and all such things."

Mr. Christy keeps *dry-goods*. "All kinds of cotton and woolen cloth and silk-goods." "Laces, ribbons, and buttons." But he keeps boots and shoes, too." Yes, in many country stores the stock is very wide.

Mrs. McCarnes keeps a *millinery* store. "Ladies' hats and bonnets." "Ribbons, collars, and laces."

"Woo Toy has the *laundry*." "He washes clothes." "He says, '*no payee, no washee*.'" "When I take brother's collars and cuffs down there, he gives me a little piece of yellow paper with such queer marks on it." "I lost the paper one day, and he wouldn't give me the clothes at first." "Wing Lee, who works for him, uses a queer little frame when he counts up what you owe him." "Little wooden buttons." (Fig. 84.) "I asked him to show me how to use it, but he asked me whether I couldn't count. But he showed me how to use the counting-frame at last." "He said, 'Clos washee, number one, chop, chop, missey.'" That meant that he would wash the clothes well very soon. "What funny talk!" Some people call it *Pigeon English*. Only those who come from English ports in China talk that way. After they have been here a short time they talk much better.

Woo Toy and Wing Lee write numbers in characters like these. (Fig. 85.) There are seven other figures used in writing numbers, but these are the first ten.

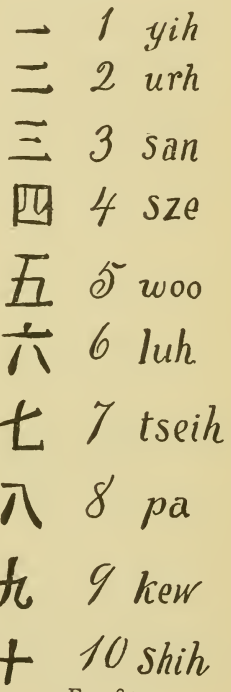


Fig. 85.

"These two men are yellow."

"Mr. Brooks keeps the barber shop." "He is a black man." "A negro." "Barbers have for their work the shaving of beards, and cutting and dressing the hair."

Mr. Ramsey bakes bread and cakes. His place of BUSINESS is called the *bakery*.

Mr. Clutton has the *drug-store*, and Mrs. Hunt keeps a *book-store*.

Mr. Martin carries on his business as a butcher, and keeps the *meat shop*.

So, also, we find the trade of the weaver represented by those men and women who work in the *woolen-mill* on Wolf Creek, and by Mrs. Carter, who weaves carpets on an old-fashioned loom. "Rag-carpets." "Quite pretty carpets, too, with stripes of yellow and black, and red and gray."

Now we have some more kinds of trades to add to our list, and we can make this list of the PLACES OF BUSINESS of the

Merchants.

PLACES OF BUSINESS.

The Grocery. *The Bakery.*

Meat-shop—*and*

Hardware - - - - - - - -
Dry-goods - - - - - - -
Flour and Feed - - -
Millinery - - - -
Drug - - -
Book - -

} STORES.

These merchants buy GOODS in large quantities [WHOLESALE] and sell in smaller quantities to the users or consumers [RETAIL].

(According to the degree of advancement of the children the teacher should here give exercises in the writing of common bills of goods, receipts, etc. There is nothing to prevent the lesson in arithmetic taking a geographical aspect and impressing a general truth.)

John may pass to the board and add to the list men who work at trades. (The class names them.) "*Weavers, butchers, laundrymen, tin-smiths, bakers, etc.*"

"And barbers." Yes, Tommy.

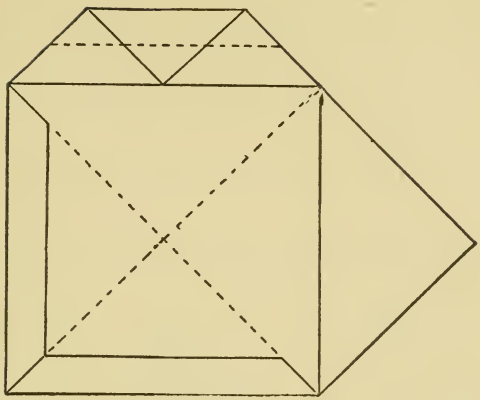


FIG. 86.

Lesson IX.

RACES OF MEN.

Here is another thought which we may express. All of these men are not of the same kind or race. "They differ in color." Also, in character and in speech. "The white people or race." "The yellow race." "The black race." "The red men or Indians."

My teacher, - - - -	*White*	RACES OF MEN.
Woo Toy, - - - - -	*Yellow*	
Mr. Brooks, - - - -	*Black*	
The Indians, - - - -	*Red*	
The Lecturer's Companion, -	*Brown*	

The minister who was lecturing brought with him a boy who was brown. "A Malay, that's what the minister called him."

Each child in the lower grade may be interested in making a series of mounted pictures of the principal races of men. Fold

the closed envelope from the square of colored paper, according to the usual directions given in paper-folding; then make the folds indicated in Fig. 86. Have the children cut out the pictures found in newspapers and periodicals and use them in making the little picture gallery.

Fig. 87 shows what a child will bring to show for the Chinese.

Fig. 87.

Others have mounted pictures of Standing Bear, Sitting Bull, Fred Douglass, and Phillips Brooks.

At the close of each lesson the children must put away all bits of paper cast aside while cutting out the pictures. Gum tragacanth dissolved in water makes a very cheap and clean paste. A wooden toothpick is a neat little implement for use in applying the paste. With a little care there need be no necessity for soiling hands, desks, or clothing.

In connection with the lessons the following may be used:

TRADES AND PROFESSIONS.

[Outline from Frœbel's "Education of Man."]

Section 40. Mabel F. McCarnes, Teacher.

"I consider it to be the first and most important part of the education of children to lead them early to think."

40. Information that the child gains from the employments of those around him.

1. The child of the *Farmer*—

Learns to distinguish between the different grains, their uses, and the adaptability of the different soils to them.

2. Of the *Sportsman*—

To understand the aiming and care of a gun.

3. Of the *Blacksmith*—

The principle of the expansion of metals by heat.

4. Of the *Merchant*—

The principle of the balance; the characteristics of the seeds and other articles sold, and the difference between weight and gravity.

5. Of the *Fishermen*—

Some of the habits of fish.

6. Of the *Bark-peeler* and *Tanner*—

How to tan leather.

7. Of the *Shoemaker*—

How to stretch leather.

8. Of the *Doctor*—

The simple laws of health.

9. Of the *Wagon-maker*—

The plan of axles, etc.

10. Of the *Printer*—

The reversion of the model, and the printing from the type.

11. Of the *Carpenter, Joiner, Cooper, etc.*—

An idea of the plane and chisel; of the preparation of iron, the use of different woods, and to distinguish between them.

Selection from Ruskin.

"PEOPLE never have had clearly explained to them the true functions of a merchant with respect to other people. I should like the reader to be very clear about this.

"Five great intellectual professions, relating to daily necessities of life, have hitherto existed—three exist necessarily in every civilized nation:

"The Soldier's profession is to *defend* it.
"The Pastor's, to *teach* it.
"The Physician's, to *keep it in health.*
"The Lawyer's, to *enforce justice* in it.
"The Merchant's, to *provide* for it.

"That is to say, he has to understand to their very root the qualities of the thing he deals in, and the means of obtaining or producing it; and he has to apply all his sagacity and energy to the producing or obtaining it in perfect state. and distributing it at the cheapest possible price where it is most needed.

"And because the production or obtaining of any commodity involves necessarily the agency of many lives and hands, the merchant becomes in the course of his business the master and governor of large masses of men in a more direct, though less confessed, way than a military officer or pastor; so that on him falls, in great part, the responsibility for the kind of life they lead; and it becomes his duty, not only to be always considering how to produce what he sells in the purest and cheapest forms, but how to make the various employments involved in the production, or transference of it, most beneficial to the men employed. . . .

"Two main points he has in his providing function to maintain: first, his engagements (faithfulness to engagements being the real root of all possibilities in commerce); and, secondly, perfectness and purity of the thing provided; so that rather than fail in any engagement or consent to any deterioration, adulteration, or unjust and exorbitant price of that which he provides, he is bound to meet fearlessly any form of distress, poverty, or labor, which may, through maintenance of these points, come upon him."

Lesson X.

Other Occupations.

How do the persons who keep stores and other places of business let the people know what things are for sale? "They put up *signs*." What are these signs like? James may write one on the blackboard. James writes:

CLUTTON BROS.,
DRUG STORE.

"In the city I saw a big bowl upon a post in front of the drug-store." That is called a mortar and pestle. The clerk uses a small mortar and pestle when he grinds and mixes the drugs. "The barber has a tall pole striped with red and white." "I can't see what that means."

Long ago barbers performed the duties of *surgeons*, and the stripes represented the winding of the bandage around the arm of the patient. The persons who do such work now are called *surgeons* or *doctors*. "They take care of the health of people." "They help us to become well again." "We should be careful of our health." "By exercise." Little doctors at home.

Those that educate the children are called *teachers*. Doctors and teachers follow PROFESSIONS. Can you name other men who have professions? "The *lawyer* writes deeds and other papers, and gives advice about law." "He argues cases in court."

The *minister* or *pastor* has charge of a church or congregation. "The sexton?" No, not in the same way. "He preaches." "We call our minister the *rector*." "St. Marks." Very well. Let us make the list.

Men having Professions.

Surgeon.	Minister.
Doctor.	Lawyer.
Teacher.	(Others)

These are very useful men.

How did we decide to bring the saws from Philadelphia to Pittsburg? (Fig. 88.) We will take the rails made at Pittsburg and lay a track to Philadelphia. At Altoona we will put an engine on the track and run to Harrisburg. Then we will take some

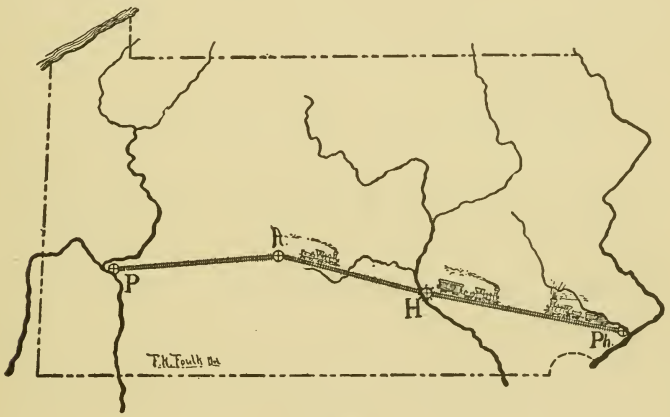


FIG. 88
(By a boy of fifteen.)

Commerce.

cars at Harrisburg and run down to Philadelphia. Here we can load the cars with sloyd saws and other things, and run back to Pittsburg.

The men have laid the track already, and the work is done. (Some rough sketching.) "A railroad." "Many men work for

the railroad company." "The man who runs the engine is the *engineer*." The man who helps him is the *fireman*. He who collects the fares and has charge of the whole train is the *conductor*. The men who help him are *brakesmen*, *baggagemen*, etc.

The trainmen are:—

Conductor,	Brakesmen,
Engineer,	Baggageman,
Fireman,	Express Agent,
Postal Agent, and others.	

The trains carry goods from one part of the country to another. So the cars are great aids in

Trade or Commerce.

Letters are carried on the cars to the POST-OFFICES. The man that attends to the mail and sees to its distribution is the *postmaster*, and he is an *officer*. Do you know how to send a letter? Where should the stamp be placed? "The address should be written plainly." "We should put a stamp on the upper right corner of the letter." "Two cents." (Fold the closed envelope, and have children write the address of some friend.)

The postmaster is called an officer; can you name some other officers? "The *constable*." "The *tax-collector*, *school director*, *burgess*, *justice of the peace*," etc. "A *policeman* in the city."

"The *mayor*." "A *sheriff* at Homestead." "The *governor* sent troops to help him keep order." "President Cleveland is now at Washington."

These are

Officers for Government.

Postmaster,
School Director,
Tax Collector,
Policeman, Constable,
Sheriff, Justice of the Peace,
Mayor, Burgess.
Governor,
President.

Lesson XI.

Local Products.

We may make written lists of the animals, vegetables, and minerals found within our school district.

Animal, Vegetable, and Mineral Productions

of wolford school district, slippery rock, butler county, pa.

Frances E. Hays, "*C*" *class.* Illula S. Christley, *Teacher.*

Animals.

Fox,	Guinea-hen,	Humming-bird,	Hornet,
Horse,	Duck,	Ladybird,	Yellowjacket,
Cow,	Goose,	Toad,	Wasp,
Pig,	Peafowl,	Frog,	Honey-bee,
Sheep,	Pigeon,	Tortoise,	Potato-bug,
Goat,	Robin,	Crab,	Snake-feeder,
Dog,	Wren,	Lizard,	Weevil,
Cat,	Sparrow,	Tree-frog,	Cabbage-worm,
Rabbit,	Blackbird,	German Carp,	Tomato-worm,
Groundhog,	Crow,	Blacksnake,	Rose-bug,
Opossum,	Hawk,	House-snake,	Firefly,
Norway rat,	Yellowbird,	Garter-snake,	Earth-worm,
Field-mouse,	Screech-owl,	Rattlesnake,	Centipede,
Barn-mouse,	Barn-owl,	Water-snake,	Flea,
Gray squirrel,	Woodpecker,	Bumblebee,	Gnat,
Flying squirrel,	Sap-sucker.	Ant,	Sheep-tick,
Chipmunk,	Bluejay,	Cricket,	Gadfly,
Pine-squirrel,	Meadow-lark,	Moth,	Roach,
Skunk,	Whippoorwill,	Horsefly,	Miller,
Raccoon,	Bobolink,	Butterfly,	Caterpillar,
Muskrat,	Chippie,	Grasshopper,	Beetle,
Mink,	Oriole,	Snail,	Ladybug,
Weasel,	Summer swallow,	Cut-worm,	Katydid,
Bat,	Quail,	Mosquito,	Cimicidæ,
Chicken,	Pheasant,	Spider.	Apple-tree borer,
Turkey,	Turtle-dove,	House-fly,	Anoplura.

Vegetables.

Potato,	Pear,	Chickweed,	Ornamental beet,
Tomato,	Cherry,	Golden-rod,	Four-o'clock,
Cabbage,	Chokecherry,	White-oak,	Nasturtium,
Beet,	Raspberry,	Black-oak,	Hyacinth,
Turnip,	Strawberry,	Red-oak,	Nicotiana,
Parsnip,	Blackberry,	Swamp-oak,	Marigold,
Celery,	Elderberry,	Ash,	Honeysuckle,

Beans,
Pease,
Lettuce,
Kohl Rabi,
Cauliflower,
Radish,
Onion,
Salsify,
Spinach,
Sage,
Parsley,
Cucumber,
Muskmelon,
Pumpkin,
Eggplant,
Peppers,
Squash,
Mushroom,
Peppermint,
Hops,
Rhubarb,
Horseradish,
Mustard,
Carrot,
Rutabaga,
Catnip,
Caraway,
May-apple,
Asparagus,
Chives,
Garlic,
Apple,
Peach,
Plum,

Dewberry,
Juneberry,
Huckleberry,
Gooseberry,
Wild-plum,
Grape,
Currant,
Quince,
Crab-apple,
Wheat,
Oats,
Corn,
Rye,
Buckwheat,
White clover,
Mammoth clover,
Medium clover,
Alsike clover,
Timothy grass,
Red-top grass,
Wild grass,
Fall grass,
Blue-grass,
Burdock,
Plantain,
Smartweed,
Ragweed,
Nettle,
Parsley,
Mullein,
Canada-thistle,
Common thistle,
Texas burr,
Tansy,

Maple,
Chestnut,
Hickory,
Gum,
Wild cherry,
Dogwood,
Ironwood,
Locust,
Linden,
Black walnut,
White walnut,
Alder,
Sassafras,
Elm,
Poplar,
Willow,
White-thorn,
Balm-of-Gilead,
Geranium,
Fuchsia,
Calla-lily,
Leopard-lily,
Cactus,
Tulip,
Poppy,
Rose,
Pink,
Feverfew,
Pansy,
Sweetpea,
Forget-me-not,
Chrysanthemum,
Gladiolus,
Marshmallow,

Fern,
Moss.
Caladium,
Crape-myrtle,
Ivy,
Mignonette,
Daisy,
Violet,
Lady-slipper,
Dahlia,
Aster,
Hydrangea,
Bleeding-heart,
Peony,
Flowering Almond,
Megarrhiza Californica,
Clematis,
Snowball,
Lilac,
Verbena,
Heliotrope,
Garland or Mock Orange,
Symplocarpus,
Mulberry,
Apricot,
Sea-onion,
Oxalis,
Snapdragon,
Bridal-wreath,

Minerals.

Iron-ore,
Coal,
Limestone,

Flagstone,
Sandstone,
Sand,

Fire-clay,
Brick-clay,
Oil,

Gas,
Water.

The dictionary had been consulted when Cimicidæ and Anoplura were added to the list. Let us hope that these last two are not very generally distributed in the district. How many of our children are able to recognize a dozen minerals, know the names of one hundred and four animals common in the locality, or can name one hundred and sixty vegetables. Old dame Nature is a wonderful teacher of children.

Some Studies in Associated Lines.

Study I. A Myth—The Stepmother Flower.
II. The Little Plant that Longed to be Useful.
III. What the Young Oak Said.
IV. A Queer Counting Device.
V. A Study of the History of a State.

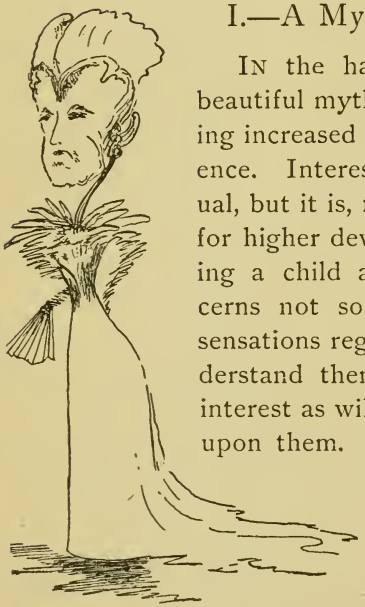


Fig. 89.—Cruel Queen of the Pansies.

I.—A Myth. The Stepmother Flower.

In the hands of the skillful teacher many beautiful myths may be used to advantage in giving increased interest to many of the facts in science. Interest is emotional rather than intellectual, but it is, nevertheless, the indispensable basis for higher development. The problem of teaching a child any technical, scientific facts, concerns not so much the manner of giving him sensations regarding them, nor yet power to understand them, but rather how to arouse such interest as will lead him to set his mind at work upon them. Many of these stories, coming up to us out of the folk-lore of the race, act upon the child's nature through the subtle element, sympathy, and the growing mind is held to matter which might otherwise fail to secure recognition.

The Cruel Queen of the Pansies.

During the spring term the children in the school received instructions in some of the simpler facts of botany, and learned about sepals, petals, calyxes and corollas. Attention was given, also, to the beautiful colors found in the flowers.

Nellie's mother takes great pride in her choice varieties of pansies, and many bouquets of the rich, velvety beauties find their way into the schoolroom now that the duties of school life have been taken up again. The teacher received some of the pansies this morning, and said: "Children, shall I tell you the legend of the pansy to-day? Little Nellie has brought some beautiful ones to me this morning, and I want you to take a long look at them before I begin the story. Harry may pass this pansy to his seat-mate as soon as he has looked at it carefully, Susan may give this to Mary, and Josie this one to Gertrude." After a number of flowers were thus distributed, the teacher said: "Count the petals; now the sepals." "It has five petals (Fig. 90) and five sepals," says Harry. "Look for the little man deep (See 5, Fig. 91) down in the center of the flower." "I have found him." "So have I." "He has a yellow cloak over his shoulders." The attention of the children was drawn to the great lower petal which seems to spread itself out as if it were proud of its gorgeous beauty. (3). "What a splendid velvet dress!" "Do you see the two plain petals? (1, 1) The upper ones have only plain colors." 'But the other two petals (2, 2) are very handsome and much like the large one." "All embroidered with gold like the large petal."

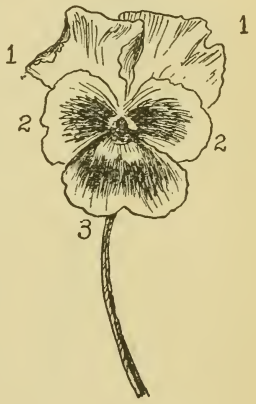


FIG. 90.

"Listen now, my children, to the story as it is told to the little children in Germany.

"A long time ago there lived a king who had a very beautiful wife and two charming, accomplished daughters. But death claimed the mother, and after a time their father married a queen who also had two daughters. But the stepmother was very jealous of any praise given the king's daughters. She tried to make them unhappy in all possible ways, and dressed them in plain clothes that she might make them miserable and envious of her own daughters, whom she dressed in the richest and costliest fabrics. The king's daughters, however, cared nothing for costly dresses, but rather sought ways for adorning their minds and becoming useful to their father and his people.

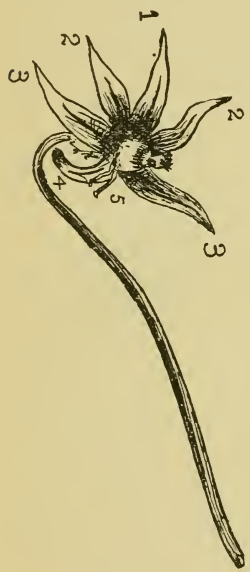


FIG. 91.

"The queen's own daughters, although decked with the most costly jewels and clothed with garments only less beautiful than those of the queen herself, were still unable to excite the love and admiration of the king's subjects, and still less the love of many young princes who came to woo the king's daughters. The queen became very angry, and resolved to offer every insult to those two stepdaughters. Around the throne (Fig. 90) in the court-room of the palace were five massive chairs of green bronze. 'You shall have but one chair together,' said the wicked queen to the modest princesses, her stepdaughters. Do you wish to see the green chair upon which the two princesses are seated? Then pull off the two upper petals of the pansy." "I see it now," says Sarah, "how cruel the old queen was!" (1) "But to her

own daughters," continued the teacher, "she gave each a chair, and you may see them by pulling off the two side petals. (2, 2.)

"But there were five women and five chairs, and how could the queen find an excuse for putting her two stepdaughters upon one chair? 'Ah, I have it,' said she. 'My robes are so elegant and costly that I fear they would be crushed were I to sit upon one chair. I really need two chairs that I may spread out my beautiful robes and take proper care of them.' Pull off the large petal, May." Now all the children were able to see that the queen had occupied two chairs.

"But the queen was not satisfied by merely making her stepdaughters uncomfortable, she even tried to withhold their food from them. At last the king became so indignant that he banished the queen and her daughters from his kingdom. Now the queen in her youth had been a sorceress, and had learned magic from an old wizard. While living with the king she had forgotten much of the art, and the old wizard was dead. So she thought, and thought, and thought, and finally recovered so much of her wonderful powers that she was able to carry out her vows of vengeance and have the king again under her control. She condemned him to sit forever upon his throne with his feet plunged in boiling water." The teacher then showed the poor old king seated on his throne in the center of the five chairs. "See, he is clad in his golden robes of state, and just beneath him is the tub (4) of boiling water. Look at his poor parboiled legs and feet." (5). As the teacher spoke, the sac or spur (4) of the pansy was gently slit with a pin, and the feet disclosed. (Fig. 91.)

II. The Little Plant That Longed to be Useful.

Near the banks of a southern river, in the warm, rich soil of the fields, a little plant was growing with many of its companions.

Day by day it had been growing—simply growing—since that morning in April when the negroes had put the little green seeds into the ground. It had lain there in its warm earth-bed until the rain came from the clouds and soaked down to the little seed and said, "Grow, little seed, grow!"

So to the little seed there came a queer feeling, as if its little green jacket would burst.

"I *can* grow," thought the little seed, "and I *will*."

Now with a little seed, *to think* is *to act;* so out through the green sack or jacket it thrust a little white foot down into the rich, brown earth. And now from the very top of the green sack a little head peeped out.

"Come up, come up, my little one!" said the great sun as a warm smile spread over his broad face. And the little plant came up, and grew and grew.

The days went by, and the plant put forth dark green, five-lobed leaves (Fig. 92), filled with blue veins in which the sap, its blood, was flowing. Men came with hoes and kept down the weeds that tried to choke the plant. How the young plant enjoyed the sight of its companions, as in long and regular rows they stretched across the broad field! Some of them seemed larger and handsomer than itself, but the little plant knew that against the great superiority of others there is no remedy but love; so it just kept on loving and admiring them. Growing, too so very fast that now the plant was almost as high as your desks. Then it thought and thought; and with a plant, *to think* is *to act*, and each *thought* means a *blossom.*

Such a beautiful straw-colored blossom each one was! Five dainty yellow petals, each with a purple spot at its base (Fig. 92). The whole flower looked very much like a hollyhock. Indeed, there was nothing strange about that, for the little plant was first cousin to the proud hollyhocks up by the mansion, and hoped to

see them at the annual reunion of the Mallow family. To be sure, the hollyhocks were very tall and stately, and held their heads up very high that they might show their beautiful flowers in all their tints of rose, purple, and yellow, and sometimes purest white. Had they not come all the way from Syria? But our little plant knew that it is better to be *useful* than to be *beautiful*, so it kept on growing.

Yet the hollyhocks need not have looked so scornfully upon

Fig. 92.

it, for Pliny, an old Roman author who lived many years ago, had found a quaint Arabic name for our little friend, and called it *Gossypium.* But then the negroes did not use that name; they called our little plant—Cotton.

How beautiful its pale yellow blossoms were in the morning sunshine! Each pretty flower was held up by the fingers of a little hand through the three-parted sleeve with its laces and fringes at the wrist. And deep down in each blossom there was a little green pocket.

All the brothers and sisters of our little plant had been *thinking*, too, and the whole rich field looked like a vast garden of flowers. The little plant could see the yellow blossoms all over the cotton-field. As the sun rose high at noon, many of the blossoms became pure white. Were its own blossoms taking on that beautiful creamy white? The little cotton-plant blushed at the thought of its own loveliness, and a flush of delicate pink spread over the pretty petals. Surely the lordly hollyhocks could not be scornful now! As the sun went down the flush on the petals became deeper, and in the morning many flowers had changed to a most beautiful pink in color. How glad the little plant was!

But then, one cannot be beautiful always. Soon the sun came up to fade the flowers, and the rain and wind came to tear them, until all their beauty and use seemed gone. Still the little plant held up its arms and hands to the sun. And now the little green three-cornered pockets grew larger and larger, day by day, as the little hands still clutched them.

"I shall be of use some day," said the little plant to itself, as it dreamed of its lovely blossoms through the long, sultry days of summer. Little seeds were growing in the pockets, and resting on beds of downy softness.

How very warm the days were, and how the sun did scorch the pockets until they became quite brown! The little cotton-plant *thought*, and—Pop! pop!! The brown pockets were burst open, and the top of the plant seemed covered with snow. Had a storm of ready-made snowballs fallen upon the cotton-field? (Fig. 93.)

Soon some colored people came into the field and commenced to pick off the *bolls* of cotton fibre which the plants had produced. And down from the mansion-house the owner of the plantation came with his little daughter Etta. As they

passed along the field, the little cotton-plant heard the father saying :

" The cotton is picked and carried in bags to the cotton-gin.

Fig. 93.

This machine separates the seeds from the fiber of the cotton. Then the cotton is pressed into big bundles or bales, and these

are carried away by steamers to distant towns, and made into calico, gingham, sheeting, or muslin. The Hindoos make some muslin so fine that when it is laid upon the grass and covered with dew it looks like a spider's web. They call them *webs of woven wind.*

The little plant wondered what would become of its fluffy globes of pure white cotton, and hoped that they might be made

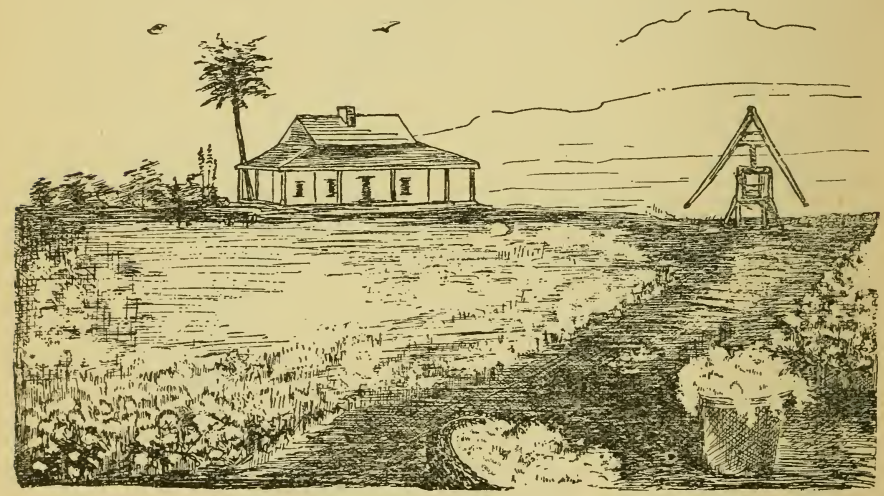


FIG. 94.

into such beautiful fabrics as those of which the father was speaking. Then it would be of some use.

"Papa, papa, let me pick some cotton," cried Etta as she passed along the path. (Fig. 94.)

The plant seemed to stretch out to her its hands to give up the ten beautiful bolls of cotton that it held. So, when Etta's father told her she might pick the cotton, the little girl gathered

all that the plant had, and put the pure white bolls into the large basket.

The little plant was now at leisure to watch the men and women as they came day after day to gather the ripened cotton. For the cotton did not ripen all at once. When you put corn into a popper, some of the kernels will pop out sooner than others; and in the same way the bolls of cotton pop out under the heat of the southern sun. The cotton continued to ripen and open for some months, but the little plant still stood there in the field.

"Whatever will become of my treasure of cotton that the little girl gathered?" said the plant to itself.

Along the path a sleepy old mule was coming, dragging a cart loaded with cotton. "I am sure that something useful will be made from it, and that I have lived to some purpose. That is all one needs to know to be happy. I wonder why the webs of woven wind—"

Just then the wheel of the cotton-cart came crushing down upon the little plant, and its life was ended. Wouldn't you like to know, too, what became of the ten cotton bolls that Etta gathered?

III. What the Young Oak Said.

Children, have you ever heard the voices among the forest trees? Did you ever hear the trees whispering to themselves, or sighing or sobbing, oh, so sorrowfully? Have you not heard them singing or chanting, now soft and low in sweetest melody, now loud and clear in grand, triumphant chorus? And then, how the great old oaks speak to us of strength and power as they spread wide their kindly arms, making shade for weary children! Yes, and the laughing, happy maples, brightest and most cheer-

ful of trees; as the sunshine plays among their leaves, the whole summer seems to lie hidden there.

"Once I rode through the dark wood, and the trees seemed to weep and moan as the wind swept through them," says Lettie. "At home we have two old oaks which bend toward each other and seem to be speaking in loving tones; we call them the 'Affectionate Oaks,'" says Mary.

"But, Miss Christley, I never heard the trees say anything," says Tom. What did the pussy-willows tell you? Did they not tell you that spring had come? "I did not think of that." And then the tall and slender iron-wood and maple saplings seem to laugh and say, "The brooks are open, come a-fishing, Tom."

To-day we brought some beautiful young oaks and maples from the woods and set them out upon the lawn. "They will be great trees some day." "Two kinds of maples in the woods." "Hard and soft." "Different leaves." "White oaks, red oaks, pin oaks, and black oaks." Can we make the young trees tell their story? Let us go out into the woods to-day and see. The snows have melted away, and warm rains have come. Here we are under this great oak, which is such a big, kind-hearted tree that we feel something of trust coming into our hearts as we look at the grand tree's gnarled branches.

> "A goodly tree it is;
> And, towering to the skies,
> The fury of the wind defies;
> From age to age in virtue strong,
> Inured to stand and suffer wrong."

Take that stick and push aside some of the dead leaves. Pick up some of the acorns,—the cradles in which the baby oaks lie sleeping. "Did you say sleeping?" This one is awaking;

for here the cradle shell is softened, and the germ has swollen and burst through to send the young oak's baby foot, the *radicle*, down into the soft, black earth. "See the cradle's delicate pink lining." (Fig. 95.) But look at the one that Johnny brings us. (Fig. 96.) Here the delicate pinkish-green head shoots upward to the light. This head is called the *plumule*. "Looks like a plume." "How fast it grows!" "What does the baby oak eat?" He lives upon *starch*. "Stored up for him in his cradle."

Fig. 95.

In the heart of a seed
Buried deep, so deep,
A dear little plant
Lay fast asleep.
"Wake!" said the sunshine
"And creep to the light,"
"Wake!" said the voice
Of the raindrop bright.
The little plant heard,
And it rose to see
What the wonderful
Outside world might be.

Break open the brown cradle shell and see the two thick loaves of bread. "White, with a tinge of green." The young oak is nourished by this food while the little radicle enters into the black soil and puts forth little branches and fibres all covered with fine white hairs. Through these branches the young oak drinks up water from the soil. "Bread and water." "Starch." We shall prove the starch to be in the acorn when we go back to the class-room. So the young oak is nourished by the starch-food of the two loaves. Some call these *cotyledons*.

After a few days the young oak shows a well grown root and stem, and sends out broad pink-green leaves. Mary has found one of the large oak-babies. How beautiful it is! See, there is no more food in the shriveled acorn (Fig. 97), and so the young oakling must draw all of his food from the earth and the air. This he has learned to do, and the now useless cradle falls away. What a grand little sapling it is! Don't you think it will become a great red oak tree some day and have many a beautiful leaf? *Do you hear what the oakling says to you?* 'Learn to depend upon your own, efforts." "Self-reliance." "Growing upward."

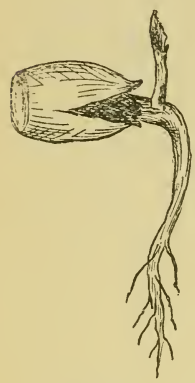


Fig. 96.

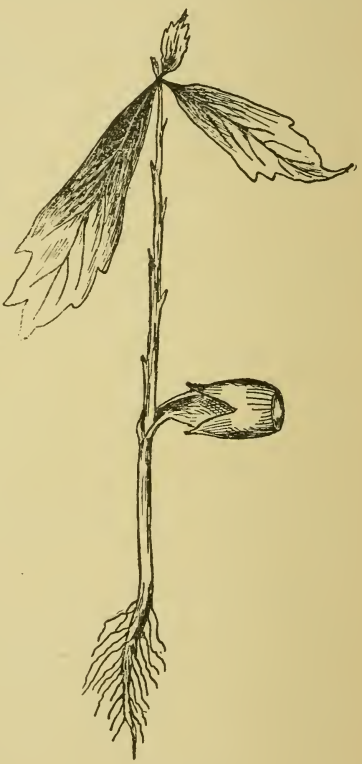


Fig. 97.

Back from our forest visit, now in quiet class-room. "Oak for the solid floors, oak in desks and tables." "Panels in doors." "The seats and chairs of oak sometimes." "Furniture for houses." Useful, valuable wood. "Bark for tanning leather." Live oak for ships. "Corks from the bark of Spanish oaks." Gallnuts are obtained from oaks, and are used in making ink and medicines. These are not fruits like acorns, but swellings caused by insects that puncture the bark of the oak

twigs and lay their eggs in the wounds. The so-called oak-apples found on the leaves of our red oaks are gallnuts, but are not valuable like those found in Western Asia, because they do not contain so much *tannin* or ink-producing acid.

Shall we find the starch in the acorn? Let me put these grains of starch into this tube (A) with some water, and Charlie

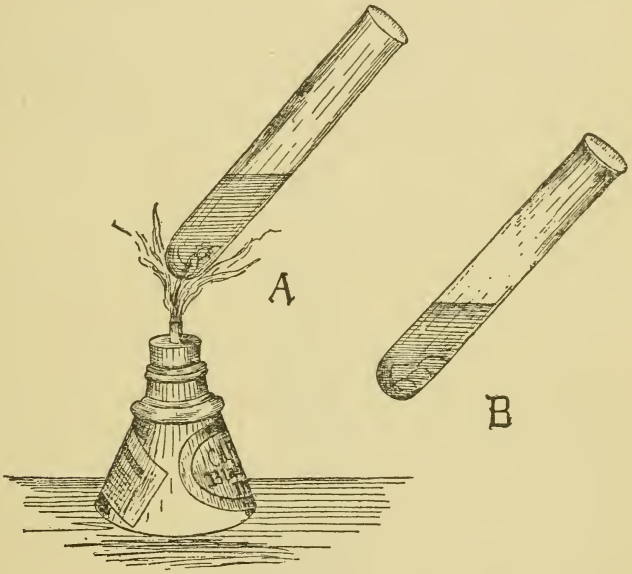


FIG. 98.

may hold it over the lamp until the water boils. Here is another tube with water, and I shall put into it these pieces of oak-bread from the acorns. Mary may boil this (B) over the lamp. Now I take these two little crystals (potassium iodide) and drop one into each tube. Hold the tubes over the lamp again until the water boils. The crystals are now dissolved. Into the starch liquid I put three drops of this acid (hydrochloric), and see!

"The liquid is blue." Chemists say that the starch has been colored blue. Mary may take this little dropping-glass and put three drops of the acid into the other tube which has the pieces of acorn in it. "Look!" "It is blue like the other." "There *is* starch in acorns." A wise man has said, "Read Nature in the language of experiment."

IV. A Queer Counting Device.

The Chimpu Used by Peruvian and Bolivian Indians.

The chimpu is a reckoning device still employed in some remote parts of Peru and Bolivia. It consists principally of a cer-

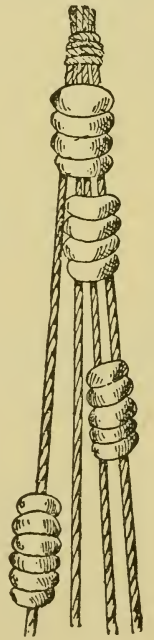


FIG. 99.—THE CHIMPU.

tain number of cords tied together at one of their extremities and

along which slide small perforated balls. The cords are of different colors, and the balls are made of the shells of various fruits. These balls can be strung all at the same time upon all the cords, or upon a certain number only.

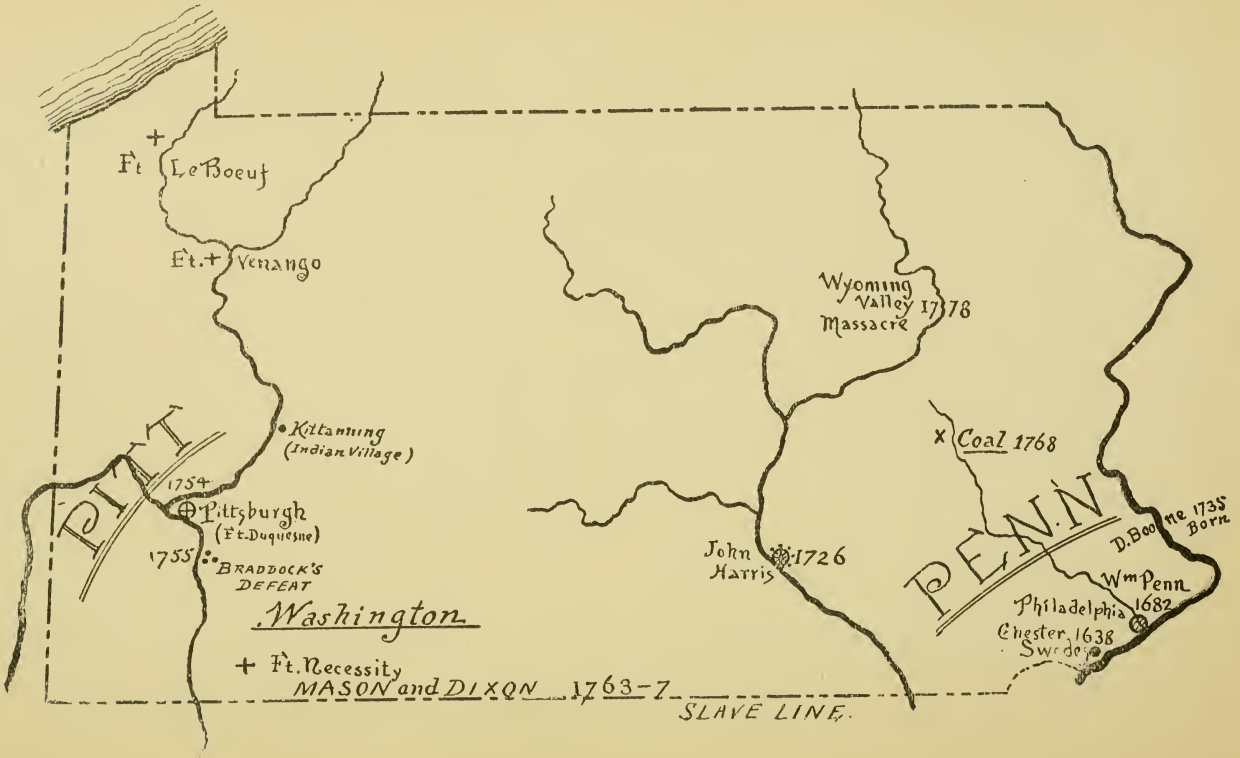
The Indian thus has a means of creating for himself categories of juxtaposed numbers corresponding in our processes to as many columns as there are cords in the apparatus. If, as it happens, moreover, the native calculator decides that the balls strung a single time shall represent units, that those through which two cords pass shall equal tens, etc., he will be able to represent any number whatever. He will figure, for example, as in the drawing, the number 4456 by stringing 6 balls on one cord, 5 on two cords, 4 on three cords, and 4 on four cords. The little instrument once tied at the lower extremity, as it was previously at the upper, will indefinitely preserve the quadruple numbers which have been confided to it.

V. A Study of the History of a State.

Successful teachers of geography and history will readily admit that these two branches of study are very closely related, and cannot be separated in the logical development of either. The geographic treatment of history is essential to the clear understanding of the physical conditions of human society. Historical study is made much more attractive to the child when his own interest can be made to pass into the narrative through full illustrations from biography, and the careful introduction of the details of local history. Nor have we far to seek the reason for this increased attention and interest. The association of ideas through contiguity in time and place, together with the correlations of cause and effect, etc., will offer full explanation. But in these days teachers are beginning to tire of the endless preaching of the bare psychological truths, and are rather disposed to ask

with St. Paul, not "What wilt thou have me believe?" but "*What wilt thou have me to do?*" If the submission of the following plan for "doing" should afford help to my fellow-workers, the purpose of this study will be accomplished.

In all the older states the places of note are very numerous, and many of the younger states possess spots no less sacred in the history of American liberty. The historical events and noted names associated with the history of the great state of Pennsylvania may all be grouped about the three great rivers of the state. Let the teacher or pupil prepare a simple outline of the state, drawn upon manilla paper, and with the courses of the rivers carefully marked. Now, as the text-book is studied, let the pupils be instructed to note carefully all facts having a direct bearing upon the history of their own state, and have these names indicated in the proper places upon the chart. Thus, it will be found that in the period preceding the Revolution, the grouping occurs about the Delaware and the two branches of the Ohio. In the eastern part of the state the great name of Penn overshadows the whole section, while Pitt is associated with all the names and places of the western part. The central portion, afterwards so celebrated through the bloody struggle at Gettysburg, has few associations with that earlier time; the settlement of John Harris upon the Susquehanna marking the capital at Harrisburg. Commencing at the eastern part of the state, we have the Swedes at Chester in 1638; Wm. Penn at Philadelphia, 1682; Daniel Boone born in Berks Co., 1735; coal used as fuel, 1768; John Harris at the Susquehanna, 1726. Then we may go westward along the Mason and Dixon line, run out as a boundary in 1763-7. This afterwards became the famous *slave line*. Above it we find Ft. Necessity; then the battlefield at Braddock, 1755; Ft. Duquesne, 1754; Ft. Venango and Ft. Le Boeuf northward to Lake Erie. The little town of Kittanning localizes this period

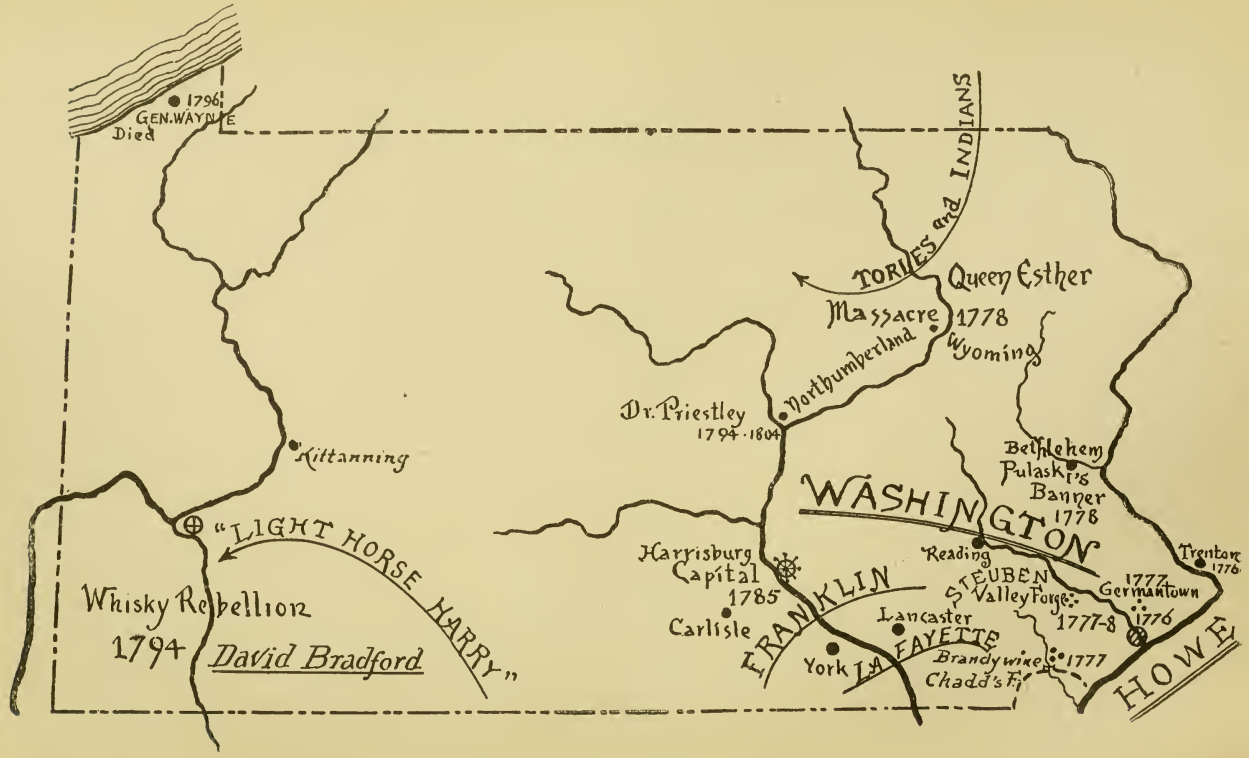

Ft LeBoeuf
Et. Venango
Kittanning (Indian Village)
PITT
1754
Pittsburgh (Ft. Duquesne)
1755
BRADDOCK'S DEFEAT
Washington
Ft. Necessity
MASON and DIXON 1763-7
SLAVE LINE.
Wyoming Valley 1778 Massacre
Coal 1768
John Harris 1726
PENN
D. Boone 1735 Born
Wm Penn
Philadelphia 1682
Chester 1638 Swedes

for some of us who come from this old Indian village on the "large stream." And these old names, associated through the French and Indian war, we find illumined by that of Washington. (See Fig. 100.)

In the period of the Revolution the region between the Susquehanna and the Delaware comes into prominence. The name of Washington overshadows all. We find Independence declared at Philadelphia, 1776; Trenton, and the crossing of the Delaware, 1776; Chadd's Ford, Brandywine, and Germantown, 1777; Valley Forge, 1777–8, with La Fayette and Steuben, the old drill master, so sorely needed. Pulaski, with his consecrated banner, rises from the old nunnery at Moravian Bethlehem, 1778, while the same year sees Queen Esther sweep down with the Tories and her Indians to the massacre at Wyoming. Howe, the British general, keeps guard over Philadelphia, while the spirit of Franklin directs, even across the broad Atlantic, the actions of the congress as it flies from Philadelphia to Lancaster and York. (See Fig. 101.)

As the war closes, Harrisburg is founded in 1785, and becomes the capital of the state in 1812. Dr. Joseph Priestley, the discoverer of oxygen, 1774, comes to this country from England in 1794 to pass the last ten years of his life. David Bradford leads in the Whisky Rebellion, of 1794, and "Light Horse Harry" comes up from Virginia to quell the insurrection. Could he dream that his greater son would lead the hosts to battle among the hills at Gettysburg? At Erie, in 1796, "Mad Anthony Wayne," returning from the Northwest Territory, dies leaving the Indians to dread the return of "Big Wind" should they dare to make war upon the Americans. Fifty-one years before, in Chester county, in the opposite corner of the state, this brave commander first saw the light of earth.

In making these charts the names may be printed in chalks of


From 1775 to 1800.
1796
GEN. WAYNE
Died
TORIES and INDIANS
Queen Esther
Massacre 1778
Wyoming
Northumberland
Dr. Priestley
1794-1804
Kittanning
Bethlehem
Pulaski's
Banner
1778
WASHINGTON
"LIGHT HORSE HARRY"
Whisky Rebellion
1794
David Bradford
Harrisburg
Capital
1785
Reading
Trenton
1776
STEUBEN
Valley Forge
1777
Germantown
1776
1777-8
Carlisle
Lancaster
FRANKLIN
FAYETTE
York
LA
Brandywine
1777
Chadd's Ft
HOWE

different colors, and these may be "fixed" or prevented from rubbing by spraying with a little absolute alcohol.

Teachers of history must not "strain at a gnat and swallow a camel," at least in the matter of dates. We have authority for all which we have given, and although all authorities do not agree,—and our cuts would not allow of the day and month,—still we would not have the MOTIVE of the work lost in any quibbles as to dates. Some may even dispute the treaty of peace, or the purchase of lands by Penn; still a monument in Philadelphia marks the spot, called by the Indians Shackamaxon, where, under a spreading elm, the formal treaty is said to have been made. In the studio of an artist may be seen many broadly executed sketches called "studies," and we have these in mind when we name our sketch from a teacher's class-room "A Study of the History of a State." We have sought for main impressions, and do not claim that there may not be a dash of misplaced color in the picture.

After all is said, the "new education," in the teaching of the subject, has passed beyond the mere microscopic accuracy of chronological tables, and would grasp something of the philosophy of history.

An old German proverb says, "What goes into the mind through the eyes never comes out again." It is to such associations of the concrete in teaching that the old Moravian schoolmaster, Comenius, appealed when he gave to the world his "Orbis Pictus."

In our study of the state of Pennsylvania we shall be somewhat arbitrary in our separation of the events into time-periods, although we have taken up four periods which were best suited to our own class-work. We would not in any way limit the series of maps to the four here given, and could wish these to be taken rather as suggestions than as models. Let us say, then, that the

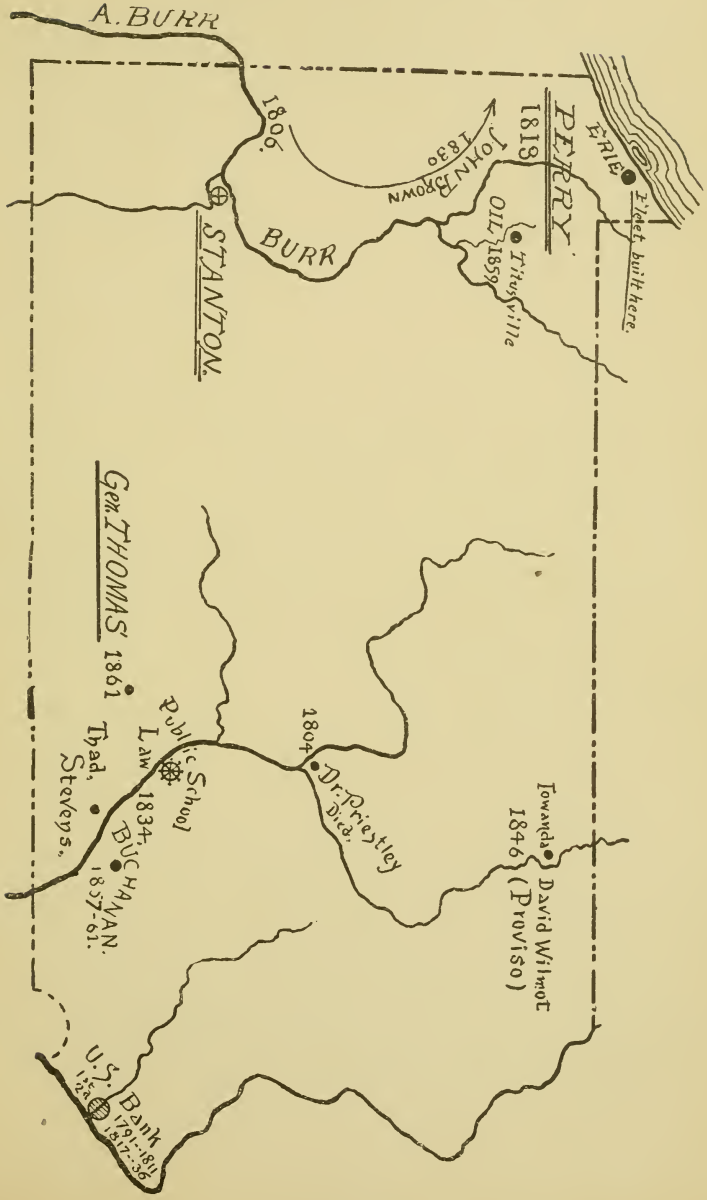

A. BURR
1806
JOHN BROWN
1830
1818
PERRY
ERIE
Fleet built here.
OIL
1859
Titusville
BURR
STANTON.
Gen. THOMAS
1861
Public School Law
1834.
Tpad. Steveys.
BUCHANAN.
1857-61.
1804
Dr. Priestley
Died.
Towanda
1846
David Wilmot
(Proviso)
U. S. Bank
1791-1811
1817-36

FIG. 102.

third period shall extend from the close of the eighteenth century to the breaking out of the Civil War (1800—1861). (Fig. 102.)

In the eastern section we find the United States Bank with its first charter, extending from 1791 to 1811; then the reorganized bank, from 1817 to 1836.

Passing now to the western river, we find Aaron Burr (1806) expecting to draw recruits from the upper Allegheny to aid him in his ambitious designs to seize the Spanish possessions in Mexico and establish himself in power as Cortez, had done before him.

The northwestern part of the state is overshadowed by the name of Perry. At Erie a fleet was built from the trees of the virgin forest; and, moving down to the western end of the lake, the young commander, who had never seen a naval battle, gained his famous victory over one of Nelson's veterans. "*We have met the enemy and they are ours*," rings through this section of the state as, on September 10, the children in our country schools still celebrate the victory. We do not know what wise instructor started such concrete teaching, but it certainly must have its influence upon the youthful minds.

What need to go to classic Greece to seek out spots sacred to liberty? We have them here! Points in the orbit of that strange offshoot of Puritan stock, "Old Ossawatomie," are found in Beaver and Crawford counties. At Darlington academy the youth learned lessons in freedom and truth. Our grand old commonwealth may well be proud that her soil has been trodden by the feet of him of whom Victor Hugo could write the fitting tribute, "For Christ, like Christ." And Wendell Phillips could say: "Well, men say he failed. Soldiers call Bunker Hill a defeat, but liberty dates from it, though Warren lay dead on the field. Actually, a man had been found *ready to die for an idea*. God be thanked for old John Brown."

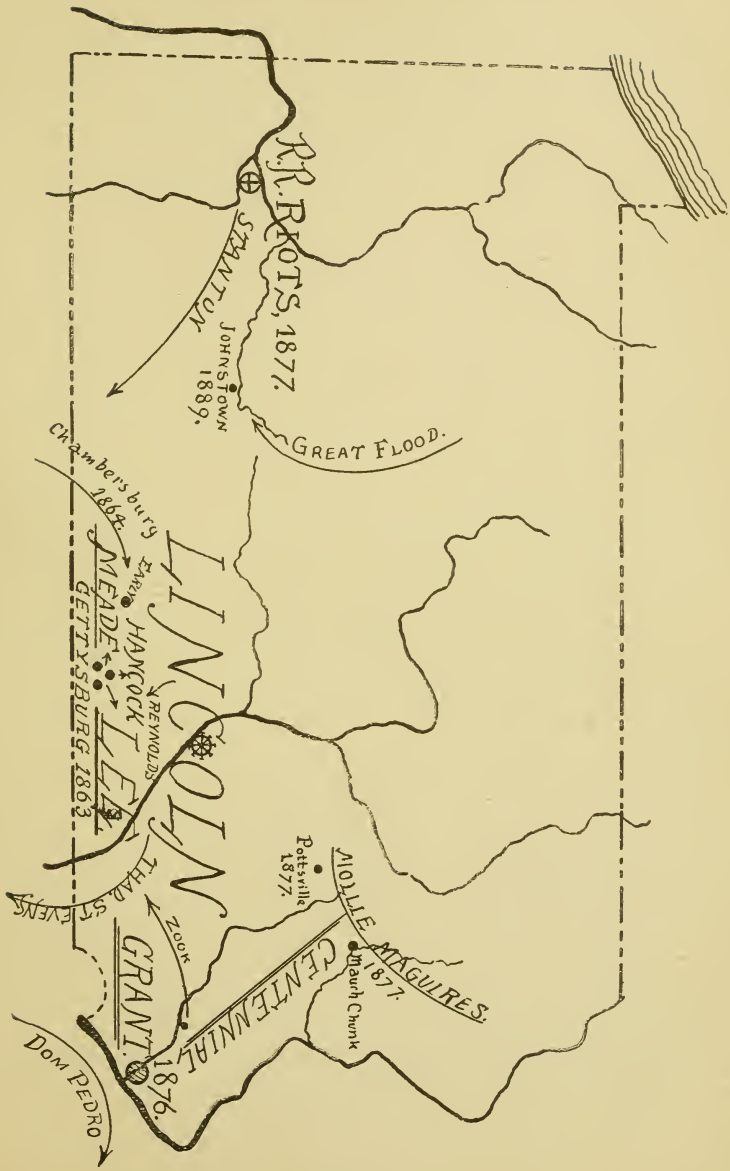

R.R. RIOTS, 1877.
STANTON
JOHNSTOWN 1889.
GREAT FLOOD.
Chambersburg 1864.
Early
MEADE
HANCOCK
REYNOLDS
GETTYSBURG 1863
LINCOLN
LEE
ANTIETAM
STEVENS
Pottsville 1877.
MOLLIE MAGUIRES.
1877.
Mauch Chunk
ZOOK
CENTENNIAL
1876.
GRANT
DOM PEDRO

FIG. 103.

But we must not dwell too long here. The region of the Susquehanna must claim a share of our attention. The public-school law, originated in 1834, was championed by Thaddeus Stevens. At Towanda, in 1846, lived David Wilmot, the author of the famous "Proviso," of which Horace Mann said, "I would pass it, rebellion or not." Lancaster was the home, as it is the burial-place, of President Buchanan (1857–61). At Carlisle, in 1861, that pure and noble patriot, Gen. Thomas, offered his services to his country rather than to his state; although he might have followed the example set by his fellow-Virginian, Gen. Robt. E. Lee. With Stanton at Pittsburg, Thomas at Carlisle, and Thaddeus Stevens to lead the way toward the nation's capital, the Civil War comes fairly into view (Fig. 103).

But reverent hands must lift the curtain here. The graves at Gettysburg mark well the field on which the armies of twenty-eight states fought to decide the question of mankind's right to freedom.

The noble sons of Pennsylvania—Meade, Hancock, Reynolds, Zook, and hosts of others—gained an undying fame; but Lincoln, the type of the true American, overshadows all the place. We hear his words as the battle-field becomes the resting-place of heroes:

"We cannot dedicate, we cannot consecrate, we cannot hallow, this ground. The brave men, living and dead, who struggled here have consecrated it far above our power to add or detract. The world will little note, nor long remember, what we say here, but it can never forget what they did here. It is rather for us—that we highly resolve that the nation shall, under God, have a new birth of freedom; and that government of the people, by the people, and for the people shall not perish from the earth."

In Philadelphia, in 1876, the Centennial brings together the North and the South to celebrate in peace the nation's birthday.

The name of Grant is here associated, and also that of the nation's guest, Dom Pedro.

But this exiled emperor of Brazil is dead. His last conscious words were an expression of his deep affection for his country, and his regret that he could not go back there to die. His death will probably put an end to all attempts to revive the Brazilian empire.

At Pottsville and at Mauch Chunk, in 1877, the "Mollie Maguires" expiated their crimes in a section associated with the massacres by Tories and Indians. The same year saw the terrible railroad riots at Pittsburg, during which the city was completely in the power of the rioters, who defied the sheriff, and boasted that no body of troops could subdue them.

In the year 1889 the valley of the Conemaugh was swept by the great flood. In this great disaster nearly the whole of the city of Johnstown was destroyed, and thousands lost their lives.

On the banks of the Monongahela, at Homestead, July 6, 1892, occurred the famous labor riots, in which the employment of Pinkerton detectives was resisted.

Not the least among the names upon the roll of honor of this great state is that of James G. Blaine. This noted statesman was born in Washington county in 1830, and died in Washington, D.C., on Friday, January 27, 1893. He had long represented Maine in the councils of the nation.

By the study of the present we may bring ourselves into closer relations with the past; and adopting a scientific method in our work, we seek after fountains of history rather than for foundations.